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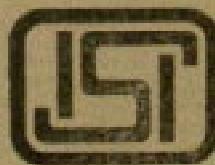
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Indian Standard
SIZES OF PROCESS VESSELS AND
LEADING DIMENSIONS

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INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Indian Standard

SIZES OF PROCESS VESSELS AND LEADING DIMENSIONS

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Indian Standard

SIZES OF PROCESS VESSELS AND LEADING DIMENSIONS

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 24 April 1967, after the draft finalized by the Chemical Engineering Sectional Committee had been approved by the Mechanical Engineering Division Council.

0.2 Chemical and allied industries cover a wide range of operations and processes and consequently use varied categories of process vessels, such as tanks and reservoirs, pans and evaporators, stills and columns, reaction vessels and autoclaves, separators, mixers and crystallizers, and driers to suit individual requirements. Obviously it is not possible to lay down sizes for all categories of vessels as some of these call for special characteristics. But standardization of dimensions for the types in most common use will enable quicker selection, ease in design and fabrication and to a certain extent facilitate stocking.

0.3 This standard recommends leading dimensions for certain categories of process vessels basing on nominal diameters already standardized (*see IS : 2844-1964**) and common proportions in respect of the leading dimensions and relating these to nominal capacities as far as possible (*see IS : 2843-1964†*). Non-preferred values of nominal diameters and nominal capacities are given within brackets.

0.4 This standard covers dimension only, design and construction should comply with appropriate Indian Standard.

0.5 Useful technical data on cylindrical shells, conical and formed ends and 'U' shaped shells are given in appendices A to J to enable working out the surface, cross-section, volume and weights.

0.6 In the preparation of this standard considerable assistance has been derived from B.S. 3161 : 1960 'Sizes of process vessels for chemical and allied industries' issued by the British Standards Institution.

*Recommendation on nominal diameters for process equipment.

†Recommendation on nominal capacities for process equipment.

1. SCOPE

1.1 This standard specifies leading dimensions of process vessels in predominant usage in the chemical and allied industries (*see* Tables 1 to 22).

2. CAPACITY

2.1 The calculated capacity in the tables is in all cases the full volume of the vessel, and each vessel has been rated at the next lower nominal capacity in IS : 2843-1964*.

3. SHAPE AND PROPERTIES

3.1 The shape of a vessel is dictated by the technical requirements. But the majority of the process vessels are cylindrical in shape with flat, or conical or dished ends (*see also* IS : 4049-1971 †) of one of the categories, such as hemispherical, semiellipsoidal or torispherical.

3.1.1 Flat or shallow conical end vessels are generally used for non-pressure or very low pressure processing.

3.1.2 Dished end vessels are applicable for pressure or vacuum operation and the standard is based on the following types, namely, hemispherical, semiellipsoidal or equivalent torispherical (deep dished) and torispherical with spherical radius equal to D and inside corner radius to $0.10D$ and $0.06D$.

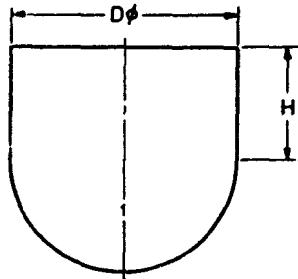
*Recommendation on nominal capacities for process equipment.

†Formed ends for tanks and pressure vessels (*First revision*).

**TABLE 1 VERTICAL CYLINDRICAL VESSELS, OPEN OR FLAT TOP,
HEMISpherical BOTTOM AND LENGTH ON STRAIGHT
(H) = APPROXIMATELY 0.5D**

(Clause 1.1)

Suitable for use as evaporating pans, mixers, reaction vessels, stills, powder driers, etc.

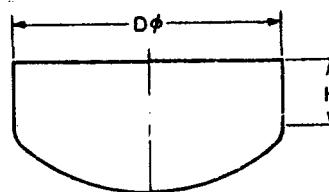


SL. No.	NOMINAL CAPACITY	DIAMETER D	LENGTH ON STRAIGHT H	VOLUME	
				Cylinder (5)	Aggregate (6) litres
(1)	(2) litres	(3) mm	(4) mm		
1	10	250	125	6.1	10.2
2	16	300	150	10.6	17.6
3	25	350	175	16.8	28
4	40	400	200	25	41
5	63	500	200	39	71
6	100	600	200	56	112
7	160	600	370	104	160
8	250	700	420	161	250
9	400	800	530	266	400
10	630	1 000	500	392	654
11	1 000	1 200	520	587	1 039
12	(1 250)	1 200	710	802	1 254
13	1 600	1 300	780	1 037	1 612
14	2 000	1 400	840	1 293	2 011
15	2 500	1 600	750	1 507	2 579
16	(3 200)	1 700	850	1 929	3 215
17	4 000	1 800	1 000	2 540	4 066
18	5 000	1 900	1 140	3 237	5 032
19	6 300	2 100	1 140	3 944	6 370
20	(8 000)	2 300	1 170	4 855	8 039
21	10 000	2 400	1 440	6 508	10 124
22	12 500	2 600	1 500	7 965	12 565
23	16 000	2 800	1 670	10 287	16 033
24	20 000	3 200	1 450	11 658	20 234
25	25 000	3 400	1 650	14 982	25 266
26	32 000	3 600	1 950	19 890	32 100
27	40 000	4 000	1 900	23 940	40 690
28	50 000	4 250	2 150	30 530	50 620
29	63 000	4 500	2 500	39 750	63 490
30	80 000	5 000	2 450	48 020	80 740

**TABLE 2 VERTICAL CYLINDRICAL VESSELS, OPEN OR FLAT TOP, WITH
DEEP DISHED (SEMIELLIPTOIDAL OR EQUIVALENT TORISPHERICAL)
BOTTOM AND LENGTH ON STRAIGHT (H) = APPROXIMATELY $0.25D$**

(Clause 1.1)

Suitable for use as evaporating pans, powder driers, etc.

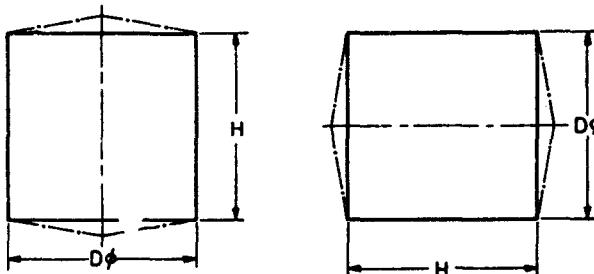


SL No.	NOMINAL CAPACITY	DIAMETER D	LENGTH ON STRAIGHT H	VOLUME	
				Cylinder	Aggregate
(1)	(2) litres	(3) mm	(4) mm	(5) litres	(6) litres
1	10	350	70	6.7	12.3
2	16	400	90	11.2	19.5
3	25	400	135	16.8	25.2
4	40	500	125	24.5	40.9
5	63	600	130	36.6	64.9
6	100	700	160	61.6	106
7	160	800	200	100	167
8	250	900	250	159	254
9	400	1 100	250	237	411
10	630	1 300	300	399	687
11	1 000	1 500	350	619	1 061
12	(1 250)	1 600	380	763	1 299
13	1 600	1 700	425	964	1 607
14	2 000	1 800	490	1 244	2 007
15	2 500	2 000	500	1 570	2 618
16	(3 200)	2 200	500	1 900	3 294
17	4 000	2 300	600	2 490	4 087
18	5 000	2 400	720	3 254	5 062
19	6 300	2 600	760	4 035	6 335
20	(8 000)	3 000	650	4 595	8 129
21	10 000	3 200	750	6 030	10 318
22	12 500	3 400	820	7 445	12 587
23	16 000	3 600	1 000	10 200	16 305
24	20 000	4 000	1 000	12 600	20 975
25	25 000	4 250	1 150	16 330	25 418
26	30 000	4 500	1 150	18 285	30 155
27	40 000	5 000	1 250	24 500	40 860

**TABLE 3 CYLINDRICAL VESSELS, VERTICAL OR HORIZONTAL,
FLAT OR CONICAL ENDS AND HEIGHT OR LENGTH ON
STRAIGHT (H) = APPROXIMATELY D**

(Clause 1.1)

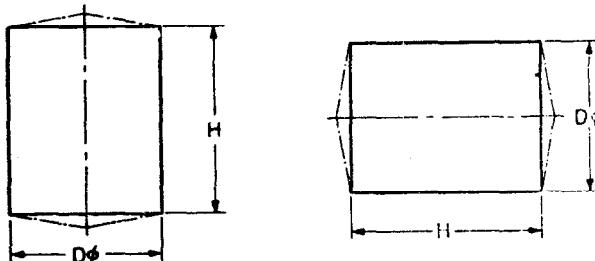
Suitable for use as mixers, stills, tanks, extraction vessels, etc.



SL. No.	NOMINAL CAPACITY	DIA- METER D	LENGTH ON STRAIGHT H	CYLINDER VOLUME	AGGREGATE VOLUME		
					Both Ends Flat	One End Open or Flat and Other Conical	Both Ends (10°) Conical (10°)
(1)	(2) litres	(3) mm	(4) mm	(5) litres	(6) litres	(7) litres	(8) litres
1	10	250	225	11.0	11.0	11.3	11.7
2	16	300	250	17.5	17.7	18.3	18.9
3	25	350	300	28.8	28.8	29.7	30.7
4	40	400	350	43.7	43.7	45.1	46.6
5	63	400	510	63.7	63.7	65.1	66.6
6	100	500	520	101	101	103	106
7	160	600	580	163	163	167	172
8	250	700	660	254	254	261	269
9	400	800	800	401	401	412	424
10	630	900	1 000	636	636	652	669
11	1 000	1 100	1 060	1 007	1 007	1 037	1 068
12	(1 250)	1 200	1 120	1 265	1 263	1 304	1 344
13	1 600	1 300	1 210	1 609	1 609	1 659	1 710
14	2 000	1 400	1 315	2 025	2 025	2 088	2 150
15	2 500	1 500	1 420	2 513	2 513	2 590	2 668
16	(3 200)	1 600	1 600	3 216	3 216	3 310	3 404
17	4 000	1 700	1 770	4 017	4 017	4 130	4 243
18	5 000	1 900	1 770	5 026	5 026	5 184	5 342
19	6 300	2 000	2 010	6 311	6 311	6 495	6 679
20	(8 000)	2 200	2 110	8 018	8 018	8 263	8 508
21	10 000	2 300	2 420	10 043	10 043	10 323	10 603
22	12 500	2 600	2 360	12 531	12 531	12 908	13 285
23	16 000	2 800	2 610	16 077	16 077	16 582	17 067
24	20 000	3 000	2 840	20 078	20 078	20 699	21 320
25	25 000	3 200	3 120	25 084	25 084	25 838	26 592
26	32 000	3 400	3 530	32 052	32 052	32 956	33 860
27	40 000	3 800	3 540	40 002	40 002	41 264	42 526
28	50 000	4 000	3 980	50 148	50 148	51 620	53 092
29	63 000	4 250	4 450	63 190	63 190	64 956	66 722
30	80 000	4 750	4 530	80 181	80 181	82 646	85 111

**TABLE 4 CYLINDRICAL VESSELS, VERTICAL OR HORIZONTAL,
FLAT OR CONICAL ENDS AND HEIGHT OR LENGTH ON
STRAIGHT (H) = APPROXIMATELY 1.25D**
(Clause 1.1)

Suitable for use as mixers, stills, tanks, extraction vessels, etc.

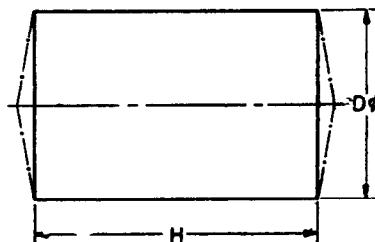
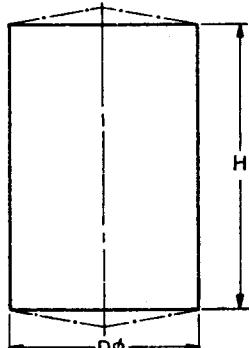


SL. No.	NOMINAL CAPACITY	DIA- METER D	LENGTH ON STRAIGHT H	CYLINDER VOLUME	AGGREGATE VOLUME		
					Both Ends Flat	One End Open or Flat and Other Conical (10°)	Both Ends Conical (10°)
(1)	(2) litres	(3) mm	(4) mm	(5) litres	(6) litres	(7) litres	(8) litres
1	16	250	325	15.9	15.9	16.2	16.6
2	25	300	375	26.5	26.5	27.1	27.7
3	40	350	438	42.1	42.1	43.0	44.0
4	63	400	510	64.0	64.0	65.4	66.9
5	400	800	900	452	452	463	475
6	630	900	1 100	700	700	716	733
7	1 000	1 000	1 275	1 001	1 001	1 024	1 047
8	1 250	1 100	1 375	1 306	1 306	1 336	1 367
9	1 600	1 200	1 500	1 696	1 696	1 735	1 775
10	2 000	1 300	1 600	2 128	2 128	2 178	2 229
11	2 500	1 400	1 700	2 618	2 618	2 681	2 744
12	3 200	1 500	1 825	3 230	3 230	3 307	3 385
13	4 000	1 600	2 000	4 020	4 020	4 114	4 208
14	5 000	1 700	2 200	4 994	4 994	5 107	5 220
15	6 300	1 900	2 300	6 532	6 532	6 690	6 848
16	8 000	2 000	2 550	8 007	8 007	8 191	8 375
17	10 000	2 200	2 700	10 260	10 260	10 505	10 750
18	12 500	2 400	2 900	13 120	13 120	13 438	13 756
19	16 000	2 600	3 200	16 990	16 990	17 394	17 798
20	20 000	2 800	3 400	20 940	20 940	21 445	21 950
21	25 000	3 000	3 700	26 150	26 150	26 771	27 392
22	32 000	3 200	4 000	32 170	32 170	32 924	33 678
23	50 000	3 800	4 500	50 850	50 850	52 112	53 374
24	63 000	4 000	5 050	63 560	63 560	65 032	66 504
25	80 000	4 250	5 650	80 230	80 230	81 996	83 762

**TABLE 5 CYLINDRICAL VESSELS, VERTICAL OR HORIZONTAL,
FLAT OR CONICAL ENDS AND HEIGHT OR LENGTH ON
STRAIGHT (H) = APPROXIMATELY 1.5D**

(Clause 1.1)

Suitable for use as mixers, stills, tanks, extraction vessels, etc.

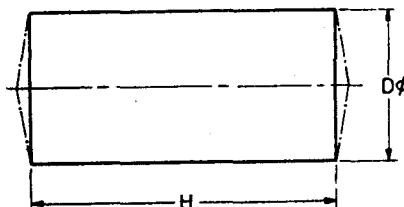
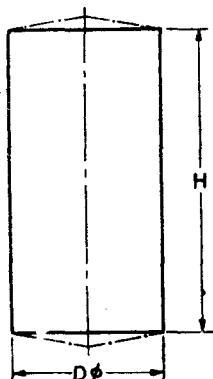


SL. No.	NOMINAL CAPACITY	DIA- METER D	LENGTH ON STRAIGHT H	CYLINDER VOLUME	AGGREGATE VOLUME		
					Both Ends Flat	One End Open or Flat and Other Conical	Both Ends Conical (10°)
(1)	(2) litres	(3) mm	(4) mm	(5) litres	(6) litres	(7) litres	(8) litres
1	10	200	330	10.2	10.2	10.3	10.5
2	16	250	350	17.1	17.1	17.4	17.8
3	25	300	420	29.8	29.8	30.4	31.0
4	40	350	490	47.0	47.0	47.9	48.9
5	63	400	560	70.0	70.0	71.4	72.9
6	160	500	820	160	160	162	165
7	250	600	900	253	253	257	262
8	400	700	1 050	404	404	411	419
9	630	800	1 270	637	637	648	660
10	1 000	1 000	1 400	1 099	1 099	1 122	1 145
11	(1 250)	1 000	1 600	1 256	1 256	1 279	1 302
12	1 600	1 100	1 700	1 615	1 615	1 645	1 676
13	2 000	1 200	1 800	2 034	2 034	2 073	2 113
14	2 500	1 300	1 900	2 527	2 527	2 577	2 628
15	(3 200)	1 400	2 100	3 234	3 234	3 297	3 360
16	4 000	1 500	2 270	4 017	4 017	4 094	4 172
17	5 000	1 600	2 500	5 025	5 025	5 119	5 213
18	6 300	1 700	2 780	6 310	6 310	6 423	6 536
19	(8 000)	1 900	2 850	8 094	8 094	8 252	8 410
20	10 000	2 000	3 200	10 048	10 048	10 232	10 416
21	12 500	2 200	3 300	12 540	12 540	12 785	13 030
22	16 000	2 400	3 550	16 046	16 046	16 364	16 682
23	20 000	2 600	3 720	20 071	20 071	20 475	20 879
24	25 000	2 800	4 070	25 071	25 071	25 576	26 081
25	32 000	3 000	4 540	32 097	32 097	32 718	33 339
26	40 000	3 200	4 980	40 039	40 039	40 793	41 547
27	50 000	3 400	5 510	50 030	50 030	50 934	51 838
28	63 000	3 800	5 580	63 054	63 054	64 316	65 578
29	80 000	4 000	6 350	80 010	80 010	81 482	82 954

**TABLE 6 CYLINDRICAL VESSELS, VERTICAL OR HORIZONTAL,
FLAT OR CONICAL ENDS AND HEIGHT OR LENGTH ON
STRAIGHT (H) = APPROXIMATELY 2D**

(Clause 1.1)

Suitable for use as mixers, stills, tanks, extraction vessels, etc.

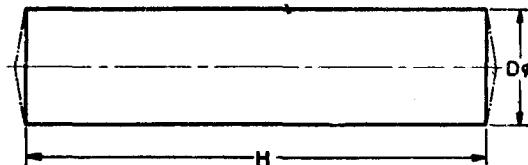
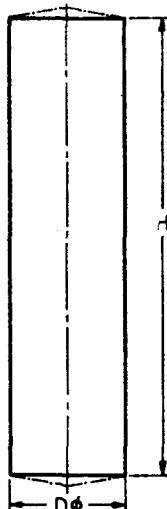


Sl. No.	NOMINAL CAPACITY	DIA- METER D	LENGTH ON STRAIGHT H	CYLINDER VOLUME	AGGREGATE VOLUME		
					Both Ends Flat	One End Open or Flat and Other Conical (10°)	Both Ends Conical (10°)
(1)	(2) litres	(3) mm	(4) mm	(5) litres	(6) litres	(7) litres	(8) litres
1	10	200	400	12.4	12.5	12.4	12.7
2	25	250	520	25.4	25.4	25.7	26.1
3	40	300	570	40.0	40.0	40.6	41.2
4	63	350	665	63.8	63.8	64.7	65.7
5	100	400	800	100	100	101	102
6	1 000	900	1 710	1 087	1 087	1 103	1 120
7	(1 250)	900	1 970	1 252	1 252	1 268	1 285
8	1 600	1 000	2 040	1 601	1 601	1 624	1 647
9	2 000	1 100	2 120	2 014	2 014	2 044	2 075
10	2 500	1 200	2 280	2 576	2 576	2 615	2 655
11	(3 200)	1 300	2 470	3 285	3 285	3 335	3 386
12	4 000	1 400	2 660	4 096	4 096	4 159	4 222
13	5 000	1 500	2 850	5 044	5 044	5 121	5 199
14	6 300	1 600	3 140	6 311	6 311	6 405	6 499
15	(8 000)	1 700	3 530	8 013	8 013	8 126	8 239
16	10 000	1 900	3 610	10 252	10 252	10 410	10 568
17	12 500	2 000	4 000	12 560	12 560	12 744	12 928
18	16 000	2 200	4 220	16 036	16 036	16 281	16 526
19	20 000	2 300	4 820	20 003	20 003	20 283	20 563
20	25 000	2 600	4 940	26 231	26 231	26 635	27 040
21	32 000	2 800	5 320	32 771	32 771	33 275	33 781
22	40 000	3 000	5 700	40 299	40 299	40 920	41 541
23	50 000	3 200	6 230	50 089	50 089	50 843	51 597
24	63 000	3 400	6 940	63 015	63 015	68 919	64 823
25	80 000	3 800	7 220	81 586	81 586	82 848	84 110

**TABLE 7 CYLINDRICAL VESSELS, VERTICAL OR HORIZONTAL,
FLAT OR CONICAL ENDS AND HEIGHT OR LENGTH ON
STRAIGHT (H) = APPROXIMATELY 3D**

(Clause 1.1)

Suitable for use as mixers, stills,
tanks, extraction vessels, etc.

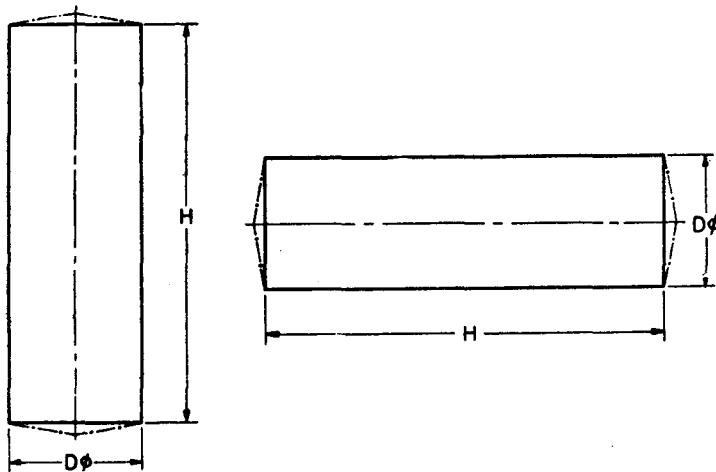


SL No.	NOMINAL CAPACITY	DIA- METER <i>D</i>	LENGTH ON STRAIGHT <i>H</i>	CYLINDER VOLUME	AGGREGATE VOLUME		
					Both Ends Flat	One End Open or Flat and Other Conical (10°)	Both End Conical (10°)
(1)	(2) litres	(3) mm	(4) mm	(5) litres	(6) litres	(7) litres	(8) litres
1	16	200	520	16.1	16.1	16.3	16.5
2	40	250	820	40.1	40.1	40.4	40.8
3	63	300	900	63.9	63.9	64.5	65.1
4	100	350	1 050	100	100	101	102
5	160	400	1 280	160	160	161	162
6	250	500	1 300	254	254	257	260
7	400	600	1 500	423	423	428	433
8	1 000	800	2 000	1 004	1 004	1 015	1 027
9	(1 250)	800	2 500	1 255	1 255	1 266	1 278
10	1 600	900	2 600	1 653	1 653	1 669	1 686
11	2 000	1 000	2 600	2 041	2 041	2 064	2 087
12	2 500	1 100	2 750	2 612	2 612	2 642	2 673
13	(3 200)	1 100	3 400	3 230	3 230	3 260	3 291
14	4 000	1 200	3 600	4 068	4 068	4 107	4 147
15	5 000	1 300	3 800	5 054	5 054	5 104	5 155
16	6 300	1 400	4 100	6 314	6 314	6 377	6 440
17	(8 000)	1 500	4 550	8 053	8 053	8 130	8 208
18	10 000	1 600	5 000	10 050	10 050	10 144	10 238
19	12 500	1 800	5 000	12 700	12 700	12 834	12 968
20	16 000	1 900	5 700	16 188	16 188	16 346	16 504
21	20 000	2 000	6 400	20 096	20 096	20 280	20 464
22	25 000	2 200	6 600	25 080	25 080	20 305	25 570
23	32 000	2 400	7 100	32 092	32 092	32 410	32 728
24	40 000	2 600	7 600	40 356	40 356	40 760	41 164
25	50 000	2 800	8 200	50 572	50 572	51 017	51 522
26	63 000	3 000	9 000	63 630	63 630	64 251	64 872
27	80 000	3 200	10 000	80 400	80 400	81 154	81 908

**TABLE 8 CYLINDRICAL VESSELS, VERTICAL OR HORIZONTAL,
FLAT OR CONICAL ENDS AND HEIGHT OR LENGTH ON
STRAIGHT (H) = APPROXIMATELY $4D$**

(Clause 1.1)

Suitable for use as mixers, stills, tanks, extraction vessels, etc.

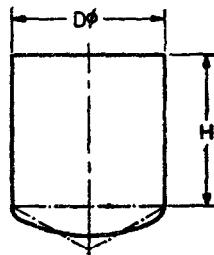


SL. No.	NOMINAL CAPACITY	DIA- METER D	LENGTH ON STRAIGHT H	CYLINDER VOLUME	AGGREGATE VOLUME		
					Both Ends Flat	One End Flat and Other Conical (10°)	Both Ends Conical (10°)
(1)	(2) litres	(3) mm	(4) mm	(5) litres	(6) litres	(7) litres	(8) litres
1	10	150	600	10.2	10.2	10.2	10.3
2	25	200	810	25.1	25.1	25.2	25.4
3	40	250	880	43.1	43.1	43.4	43.8
4	100	300	1 410	100	100	100	101
5	160	350	1 670	160	160	160	161
6	400	500	2 050	401	401	403	406
7	630	600	2 300	648	648	653	658
8	1 000	700	2 700	1 039	1 039	1 047	1 055
9	1 600	800	3 200	1 606	1 606	1 618	1 640
10	2 500	900	3 950	2 512	2 512	2 528	2 545
11	(3 200)	1 000	4 100	3 218	3 218	3 241	3 264
12	4 000	1 100	4 300	4 085	4 085	4 115	4 146
13	5 000	1 200	4 500	5 085	5 085	5 124	5 164
14	6 300	1 300	4 800	6 384	6 384	6 434	6 485
15	(8 000)	1 400	5 300	8 162	8 162	8 225	8 288
16	10 000	1 500	5 700	10 089	10 089	10 166	10 244
17	12 500	1 600	6 300	12 663	12 663	12 757	12 851
18	16 000	1 700	7 100	16 117	16 117	16 230	16 343
19	20 000	1 900	7 200	20 448	20 448	20 606	20 764
20	25 000	2 000	8 000	25 120	25 120	25 304	25 488
21	32 000	2 200	8 500	32 300	32 300	32 525	32 750
22	40 000	2 300	9 700	40 255	40 255	40 535	40 815
23	50 000	2 600	9 700	51 507	51 507	51 911	52 315
24	63 000	2 800	10 300	63 448	63 448	63 953	64 458
25	80 000	3 000	11 500	81 305	81 305	87 926	82 547

TABLE 9 VERTICAL CYLINDRICAL VESSELS, OPEN OR FLAT TOP, FORMED BOTTOM AND LENGTH ON STRAIGHT (H) = APPROXIMATELY D

(Clause 1.1)

Suitable for use as stills, mixers, reaction vessels, for extraction tanks.

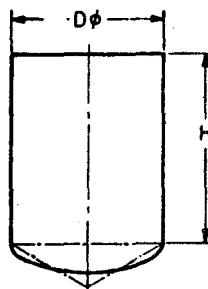


SL No.	NOMINAL CAPACITY	DIA- METER D	LENGTH ON STRAIGHT H	CYLINDER VOLUME	AGGREGATE VOLUME			
					30° Conical	Torispherical, Knuckle Radius	0·06D	0·10D Deep Dished or 45° Conical
(1)	(2) litres	(3) mm	(4) mm	(5) litres	(6) litres	(7) litres	(8) litres	(9) litres
1	10	250	225	11.0	12.1	12.3	12.7	13.0
2	16	300	250	17.7	19.7	20.0	20.7	21.2
3	25	300	325	23.0	25.0	25.3	26.0	26.5
4	40	350	400	38.4	41.6	42.0	43.1	44.0
5	63	400	475	59.3	64.2	64.8	66.4	67.6
6	100	500	500	98.0	107	108	111	114
7	160	600	550	155	171	173	179	183
8	250	700	625	240	266	269	278	284
9	400	800	750	376	414	420	432	443
10	630	900	925	588	643	650	668	683
11	1 000	1 100	1 000	950	1 051	1 064	1 098	1 124
12	(1 250)	1 100	1 210	1 149	1 250	1 265	1 297	1 323
13	1 600	1 200	1 300	1 469	1 600	1 617	1 661	1 695
14	2 000	1 300	1 400	1 862	2 029	2 051	2 106	2 150
15	2 500	1 400	1 500	2 310	2 518	2 546	2 614	2 669
16	(3 200)	1 600	1 500	3 015	3 326	3 337	3 470	3 551
17	4 000	1 700	1 650	3 745	4 118	4 167	4 290	4 388
18	5 000	1 800	1 800	4 572	5 015	5 073	5 219	5 335
19	6 300	2 000	1 850	5 809	6 417	6 496	6 696	6 857
20	(8 000)	2 100	2 120	7 335	8 039	8 130	8 362	8 548
21	10 000	2 300	2 200	9 130	10 054	10 175	10 479	10 723
22	(12 500)	2 400	2 550	11 526	12 577	12 714	13 059	13 334
23	16 000	2 600	2 800	14 868	16 204	16 378	16 817	17 168
24	20 000	2 800	3 000	18 480	20 149	20 365	20 914	21 353
25	25 000	3 000	3 250	22 978	25 029	25 297	25 972	26 512
26	32 000	3 400	3 200	29 056	32 043	32 431	33 414	34 201
27	40 000	3 600	3 600	36 720	40 266	40 727	41 895	42 825
28	50 000	3 800	4 060	45 878	50 049	50 591	51 963	53 061
29	63 000	4 250	4 030	57 226	63 060	63 820	65 739	67 276
30	80 000	4 500	4 600	73 140	80 066	80 965	83 240	85 070

TABLE 10 VERTICAL CYLINDRICAL VESSELS, OPEN OR FLAT TOP, FORMED BOTTOM AND LENGTH ON STRAIGHT (H) = APPROXIMATELY $1.25D$

(Clause 1.1)

Suitable for use in stills, mixers, reaction vessels, for extraction tanks.

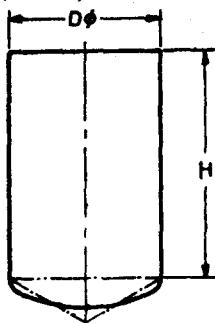


SL No.	NOMINAL CAPACITY	DIA- METER D	LENGTH ON STRAIGHT H	CYLINDER VOLUME	AGGREGATE VOLUME			
					30° Conical		0.06D	0.10D
					Torispherical, Knuckle Radius	Deep Dished or 45° Conical		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	litres	mm	mm	litres	litres	litres	litres	litres
1	16	250	310	15.2	16.3	16.5	16.9	17.2
2	25	300	350	24.8	26.8	27.1	27.8	28.3
3	40	350	400	38.4	41.6	42.0	43.1	44.0
4	63	400	475	59.3	64.1	64.8	66.4	67.6
5	400	800	900	452	490	496	508	519
6	630	900	1 050	667	722	729	747	762
7	1 000	1 000	1 250	981	1 057	1 066	1 092	1 111
8	1 250	1 100	1 300	1 235	1 336	1 349	1 383	1 409
9	1 600	1 200	1 400	1 582	1 713	1 730	1 774	1 808
10	2 000	1 300	1'525	2 028	2 195	2 217	2 272	2 316
11	2 500	1 400	1 650	2 541	2 749	2 277	2 845	2 900
12	3 200	1 500	1 800	3 186	3 442	3 776	3 560	3 628
13	4 000	1 600	1 950	3 919	4 230	4 271	4 374	4 455
14	5 000	1 700	2 100	4 767	5 140	5 189	5 312	5 410
15	6 300	1 800	2 325	5 905	6 348	6 406	6 552	6 668
16	8 000	2 000	2 400	7 536	8 144	8 223	8 423	8 584
17	10 000	2 100	2 700	9 342	10 046	10 137	10 369	10 555
18	12 500	2 300	2 850	11 827	12 751	12 372	13 176	13 420
19	25 000	2 800	3 800	23 408	25 077	25 293	25 842	26 281
20	32 000	3 200	3 700	31 080	33 570	33 894	34 714	35 368
21	40 000	3 400	4 100	37 228	40 215	40 603	41 586	42 373
22	50 000	3 600	4 600	46 920	50 466	50 927	52 095	53 025
23	63 000	4 000	4 700	59 220	64 085	64 716	66 318	67 595
24	80 000	4 250	5 250	74 550	80 384	81 144	83 063	84 600

**TABLE 11 VERTICAL CYLINDRICAL VESSELS, OPEN OR
FLAT TOP, FORMED BOTTOM AND LENGTH ON
STRAIGHT (H) = APPROXIMATELY 1.5D**

(Clause 1.1)

Suitable for use as stills, mixers, reaction vessels, for extraction tanks.

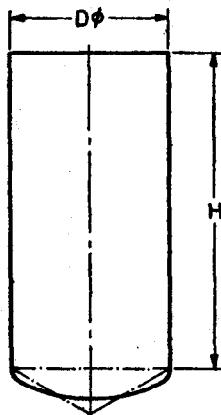


SL. NO.	NOMINAL CAPACITY	DIA- METER D	LENGTH ON STRAIGHT H	CYLINDER VOLUME		AGGREGATE VOLUME		
				Conical	30°	Torispherical, Knuckle Radius		Deep Dished or 45°
(1)	(2) litres	(3) mm	(4) mm	(5) litres	(6) litres	(7) litres	(8) litres	(9) litres
1	10	200	310	9.61	10.2	10.3	10.5	10.6
2	16	250	350	17.1	18.3	18.4	18.8	19.2
3	25	300	420	29.8	31.8	32.1	32.8	33.1
4	40	350	490	47.0	50.3	50.7	51.8	52.6
5	63	400	560	70.0	74.8	75.5	77.1	78.3
6	160	500	770	151	160	161	164	167
7	250	600	840	236	252	254	260	264
8	400	700	980	377	403	406	415	421
9	630	800	1180	592	630	636	648	659
10	1 000	900	1490	947	1 002	1 004	1 027	1 042
11	(1 250)	1 000	1 500	1 177	1 253	1 262	1 288	1 308
12	1 600	1 100	1 580	1 501	1 602	1 615	1 649	1 675
13	2 000	1 200	1 680	1 898	2 029	2 046	2 090	2 124
14	2 500	1 300	1 820	2 420	2 587	2 609	2 664	2 688
15	(3 200)	1 400	1 960	3 018	3 226	3 254	3 322	3 377
16	4 000	1 500	2 120	3 752	4 018	4 042	4 126	4 194
17	5 000	1 600	2 340	4 703	5 014	5 055	5 158	5 239
18	6 300	1 700	2 620	5 947	6 320	6 369	6 492	6 590
19	(8 000)	1 900	2 660	7 554	8 075	8 143	8 315	8 452
20	10 000	2 000	3 000	9 420	10 028	10 107	10 307	10 468
21	12 500	2 200	3 080	11 704	12 513	12 618	12 885	13 098
22	16 000	2 300	3 640	15 106	16 030	16 151	16 455	16 699
23	20 000	2 600	3 640	19 328	20 664	20 838	21 277	21 628
24	25 000	2 800	3 920	24 147	25 816	26 032	26 581	27 020
25	32 000	3 000	4 240	29 976	32 027	32 970	33 970	33 510
26	40 000	3 200	4 670	37 546	40 036	41 187	41 180	41 834
27	50 000	3 400	5 180	47 034	50 021	50 392	51 392	52 179
28	63 000	3 600	5 830	59 466	63 012	64 641	64 641	65 571
29	80 000	4 000	5 970	75 222	80 087	82 320	82 320	83 597

**TABLE 12 VERTICAL CYLINDRICAL VESSELS, OPEN OR
FLAT TOP, FORMED BOTTOM AND LENGTH ON
STRAIGHT (H) = APPROXIMATELY $2D$**

(Clause 1.1)

Suitable for use as stills, mixers without stirring gear, for extraction tanks.

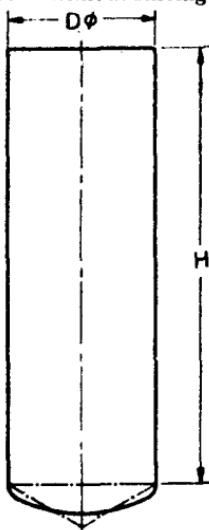


SL No.	NOMINAL CAPACITY	DIA- METER D	LENGTH ON STRAIGHT H	CYLINDER VOLUME	AGGREGATE, VOLUME			
					30° Conical	Torispherical, Knuckle Radius	0·06 D	0·10 D
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	litres	mm	mm	litres	litres	litres	litres	litres
1	10	200	380	11.7	12.3	12.3	12.5	12.7
2	25	250	500	24.5	25.6	25.8	26.2	26.5
3	40	300	600	42.6	44.6	44.9	45.6	46.2
4	63	350	665	63.8	67.0	67.4	68.5	69.4
5	100	400	770	96.2	101	101	103	104
6	1 000	900	1 710	1 087	1 142	1 150	1 168	1 182
7	(1 250)	900	1 880	1 195	1 250	1 257	1 275	1 290
8	1 600	1 000	1 950	1 530	1 606	1 615	1 641	1 661
9	2 000	1 100	2 100	1 995	2 096	2 109	2 143	2 169
10	2 500	1 200	2 280	2 576	2 712	2 724	2 768	2 802
11	(3 200)	1 300	2 470	3 285	3 452	3 474	3 529	3 573
12	4 000	1 400	2 660	4 096	4 304	4 332	4 400	4 455
13	5 000	1 500	2 850	5 044	5 300	5 334	5 418	5 486
14	6 300	1 600	3 040	6 110	6 421	6 462	6 565	6 646
15	(8 000)	1 700	3 360	7 627	8 000	8 049	8 172	8 270
16	10 000	1 800	3 770	9 575	10 018	10 076	10 222	10 338
17	12 500	2 000	3 800	11 922	12 540	12 613	12 819	12 980
18	16 000	2 100	4 430	15 327	16 031	16 122	16 354	16 540
19	20 000	2 300	4 600	19 090	20 135	20 014	20 439	20 683
20	25 000	2 600	4 940	26 231	27 567	27 741	28 180	28 531
21	32 000	2 800	5 320	32 771	34 440	34 656	35 205	35 644
22	40 000	3 000	5 700	40 299	42 350	42 618	43 293	43 833
23	50 000	3 200	6 080	48 883	51 373	51 627	52 517	53 171
24	63 000	3 400	6 610	60 018	63 005	63 393	64 376	65 163
25	80 000	3 600	7 500	76 500	80 046	80 507	81 675	82 605

TABLE 13 VERTICAL CYLINDRICAL VESSELS, OPEN OR FLAT TOP, FORMED BOTTOM AND LENGTH ON STRAIGHT (H) = APPROXIMATELY 3D

(Clause 1.1)

Suitable for use as stills, mixers without stirring gear, for extraction tanks.

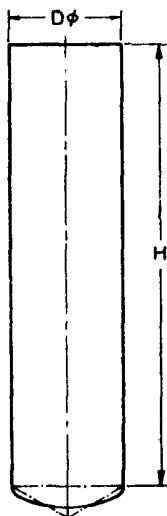


Sl. No.	NOMINAL CAPACITY	DIAMETER D	LENGTH ON CYLINDER VOLUME STRAIGHT H	AGGREGATE VOLUME				
				30° Conical		Torispherical, Knuckle Radius 0.06 D 0.10 D		Deep Dished or 45° Conical (9) litres
				(5) litres	(6) litres	(7) litres	(8) litres	
(1)	(2) litres	(3) mm	(4) mm					
1	16	200	500	15.5	16.1	16.1	16.3	16.5
2	40	250	800	39.2	40.3	40.5	40.6	41.2
3	63	300	870	61.7	63.7	64.0	64.7	65.2
4	100	350	1010	96.9	100	100	101	102
5	160	400	1250	156	160	161	163	164
6	250	500	1250	245	254	254	258	261
7	(1 250)	800	2420	1214	1253	1258	1270	1271
8	1 600	900	2450	1558	1613	1620	1638	1653
9	2 000	1 000	2 500	1962	2 038	2 048	2 073	2 093
10	2 500	1 000	3 100	2 433	2 509	2 518	2 544	2 564
11	(3 200)	1 100	3 300	3 135	3 236	3 240	3 283	3 309
12	4 000	1 200	3 450	3 898	4 029	4 046	4 090	4 124
13	5 000	1 300	3 700	4 921	5 088	5 110	5 165	5 209
14	6 300	1 400	4 000	6 160	6 368	6 396	6 464	6 519
15	(8 000)	1 500	4 400	7 788	8 044	8 078	8 162	8 230
16	10 000	1 600	4 850	9 748	10 059	10 100	10 203	10 284
17	12 500	1 700	5 350	12 144	12 517	12 566	12 689	12 787
18	16 000	1 900	5 500	15 620	16 141	16 209	16 381	16 518
19	20 000	2 000	6 200	19 468	20 076	20 155	20 355	20 516
20	25 000	2 200	6 400	24 320	25 129	25 234	25 501	25 714
21	32 000	2 400	6 900	31 188	32 239	32 376	32 721	32 996
22	40 000	2 600	7 300	38 763	40 099	40 273	40 712	41 063
23	50 000	2 800	7 850	48 356	50 025	50 241	50 790	51 229
24	63 000	3 000	8 650	61 155	63 207	63 474	64 149	64 689
25	80 000	3 200	9 650	77 586	80 076	80 400	81 220	81 874

**TABLE 14 VERTICAL CYLINDRICAL VESSELS, OPEN OR FLAT TOP,
FORMED BOTTOM AND LENGTH ON STRAIGHT (H) = APPROXIMATELY 4D**

(Clause 1.1)

Suitable for use as stills, mixers without stirring gear, for extraction tanks.

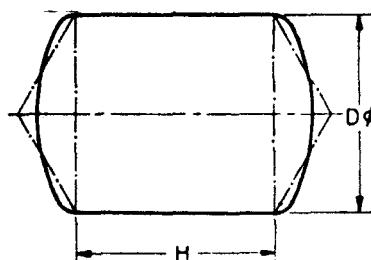
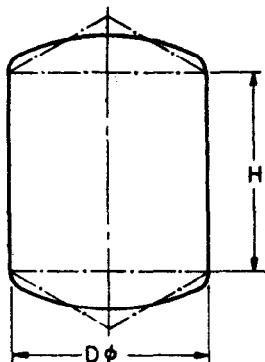


Sl. No.	NOMINAL CAPACITY	DIAMETER D	LENGTH ON STRAIGHT H	CYLINDER VOLUME	AGGREGATE VOLUME				
					30° Conical	Torispherical, Knuckle Radius	Deep Dished or 45° Conical		
(1)	(2) litres	(3) mm	(4) mm	(5) litres	(6) litres	(7) litres	(8) litres	(9) litres	
1	10	150	600	10.2	10.4	10.4	10.5	10.6	
2	25	200	800	24.8	25.4	25.4	25.6	25.8	
3	40	250	900	44.1	45.2	45.4	45.8	46.1	
4	100	300	1 380	97.9	100	100	101	101	
5	160	350	1 640	157	160	161	162	163	
6	400	500	2 000	392	401	402	405	408	
7	630	600	2 200	620	636	639	644	648	
8	1 000	700	2 600	991	1 017	1 020	1 029	1 035	
9	1 600	800	3 150	1 581	1 620	1 625	1 637	1 648	
10	2 500	900	3 850	2 448	2 503	2 510	2 528	2 543	
11	3 200	1 000	4 000	3 140	3 216	3 225	3 251	3 271	
12	4 000	1 110	4 120	3 914	4 015	4 028	4 062	4 088	
13	5 000	1 200	4 350	4 915	5 046	5 063	5 107	5 141	
14	6 300	1 130	4 650	6 184	6 351	6 373	6 428	6 472	
15	(8 000)	1 400	5 100	7 854	8 062	8 090	8 158	8 213	
16	10 000	1 500	5 520	9 770	10 026	10 060	10 144	10 212	
17	12 500	1 600	6 100	12 261	12 572	12 613	12 716	12 797	
18	16 000	1 700	6 900	15 663	16 036	16 085	16 208	16 306	
19	20 000	1 800	7 710	19 583	20 026	20 084	20 230	20 346	
20	25 000	2 000	7 800	24 492	25 100	25 179	25 379	25 540	
21	32 000	2 200	8 220	31 236	32 045	32 150	32 417	32 630	
22	40 000	2 300	9 420	39 093	40 017	40 138	40 442	40 685	
23	50 000	2 600	9 200	48 852	50 188	50 362	50 801	51 152	
24	63 000	2 800	10 000	61 600	63 269	63 485	64 034	64 473	
25	80 000	3 000	11 050	78 120	80 172	80 439	81 141	81 654	

**TABLE 15 VERTICAL OR HORIZONTAL CYLINDRICAL
VESSELS WITH FORMED ENDS AND LENGTH ON
STRAIGHT (H) = APPROXIMATELY D**

(Clause 1.1)

Suitable for use as stills, reaction vessels, tanks, driers for extraction, etc.

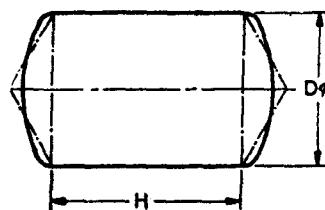
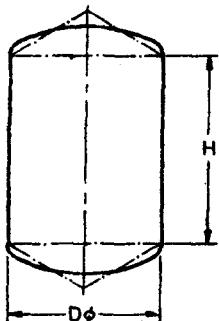


SL. No.	NOMINAL CAPACITY	DIAMETER D	LENGTH ON STRAIGHT H	CYLINDER VOLUME	AGGREGATE VOLUME			
					30° Conical	Torispherical, Knuckle Radius	0.06D	0.10D
(1)	(2) litres	(3) mm	(4) mm	(5) litres	(6) litres	(7) litres	(8) litres	(9) litres
1	10	250	200	9.8	12.1	12.4	13.2	13.9
2	16	250	300	14.7	17.0	17.3	18.1	18.8
3	25	300	300	21.3	25.4	25.9	27.3	28.3
4	40	350	350	33.6	40.1	40.9	43.1	44.8
5	63	400	430	53.7	63.4	64.7	67.7	70.4
6	100	500	420	82.3	101	103	110	115
7	160	600	480	135	167	172	183	191
8	250	700	550	211	263	269	287	300
9	400	800	650	326	403	414	439	460
10	630	900	850	540	650	665	701	730
11	1 000	1 000	1 100	863	1 015	1 034	1 085	1 125
12	(1 250)	1 100	1 110	1 054	1 256	1 282	1 350	1 402
13	1 600	1 200	1 200	1 356	1 618	1 652	1 740	1 808
14	2 000	1 300	1 300	1 729	2 063	2 107	2 217	2 305
15	2 500	1 400	2 156	2 156	2 572	2 628	2 764	2 874
16	(3 200)	1 500	1 550	2 743	3 255	3 323	3 491	3 627
17	4 000	1 600	1 700	3 417	4 039	4 121	4 327	4 489
18	5 000	1 700	1 900	4 313	5 059	5 157	5 403	5 599
19	6 300	1 900	1 900	5 396	6 438	6 574	6 918	7 192
20	(8 000)	2 000	2 200	6 908	8 124	8 282	8 682	9 004
21	10 000	2 200	2 220	8 436	10 054	10 264	10 798	11 224
22	12 500	2 400	2 320	10 486	12 588	12 862	13 552	14 102
23	16 000	2 600	2 550	13 540	16 212	16 560	17 438	18 140
24	20 000	2 800	2 750	16 940	20 278	20 710	21 808	22 686
25	25 000	3 000	3 000	21 210	25 314	25 848	27 198	28 278
26	32 000	3 200	3 400	27 336	32 316	32 964	34 604	35 912
27	40 000	3 400	3 760	34 140	40 114	40 800	42 856	44 430
28	50 000	3 800	3 700	41 810	50 152	51 236	53 980	56 176
29	63 000	4 000	4 250	53 550	63 280	64 542	67 746	70 300
30	80 000	4 500	4 200	66 780	80 630	82 430	86 986	90 640

**TABLE 16 VERTICAL OR HORIZONTAL CYLINDRICAL VESSELS
WITH FORMED ENDS AND LENGTH ON STRAIGHT**
 $(H) = \text{APPROXIMATELY } 1.25 D$

(Clause 1.1)

Suitable for use as stills, reaction vessels, tanks, driers for extraction, etc.

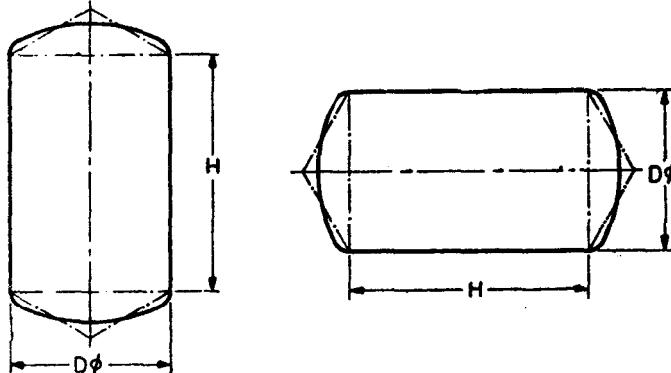


Sl. No.	NOMINAL CAPACITY	DIAMETER D	LENGTH ON STRAIGHT H	CYLINDER VOLUME	AGGREGATE VOLUME			
					30° Conical		Torispherical, Knuckle Radius $0.06D$	Deep Dished or 45° Conical $0.10D$
					(7)	(8)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	litres	mm	mm	litres	litres	litres	litres	litres
1	250	600	775	218	251	255	266	275
2	400	700	910	350	402	409	426	440
3	630	800	1 100	552	630	640	665	686
4	1 600	1 100	1 475	1 401	1 603	1 629	1 697	1 749
5	2 000	1 200	1 540	1 740	2 002	2 036	2 124	2 192
6	2 500	1 300	1 630	2 167	2 501	2 545	2 655	2 743
7	3 200	1 400	1 810	2 787	3 203	3 259	3 395	3 505
8	4 000	1 500	1 975	3 495	4 007	4 075	4 243	4 379
9	5 000	1 600	2 180	4 381	5 003	5 085	5 291	5 453
10	6 300	1 800	2 140	5 435	6 321	6 437	6 729	6 961
11	8 000	1 900	2 450	6 958	8 000	8 136	8 480	8 754
12	10 000	2 100	2 490	8 615	10 023	10 405	10 669	11 407
13	12 500	2 200	2 870	10 906	12 524	12 734	13 268	13 694
14	16 000	2 400	3 075	13 899	16 001	16 275	16 965	17 515
15	20 000	2 600	3 265	17 337	20 009	20 357	21 235	21 937
16	25 000	2 800	3 520	21 683	25 021	25 453	26 551	27 429
17	32 000	3 000	3 950	27 926	32 030	32 564	33 914	34 994
18	40 000	3 200	4 360	35 054	40 034	40 602	42 242	43 550
19	50 000	3 600	4 210	42 942	50 034	50 956	53 292	55 252
20	63 000	3 800	4 840	54 692	63 034	64 118	66 862	69 054

**TABLE 17 VERTICAL OR HORIZONTAL CYLINDRICAL VESSELS
WITH FORMED ENDS AND LENGTH ON STRAIGHT
(H) = APPROXIMATELY 1.5D**

(Clause 1.1)

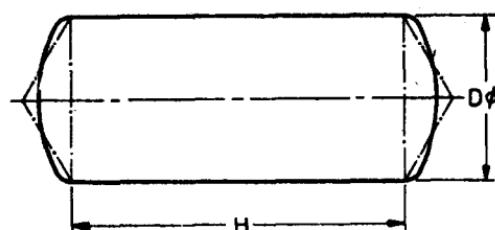
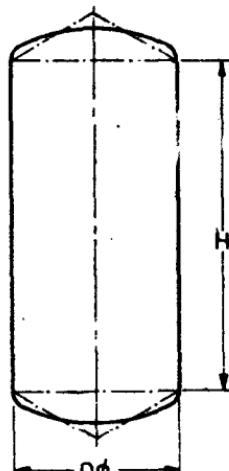
Suitable for use as stills, reaction vessels, tanks, driers for extraction, etc.



SL. No.	NOMINAL CAPACITY	DIAMETER D	LENGTH ON STRAIGHT H	CYLINDER VOLUME	AGGREGATE VOLUME				
					30° Conical		Torispherical, Knuckle Radius	Deep Dished or 45° Conical	
					0.06D	0.10D			
(1)	(2) litres	(3) mm	(4) mm	(5) litres	(6) litres	(7) litres	(8) litres	(9) litres	
1	10	200	300	9.3	10.5	10.6	11.0	11.4	
2	40	300	500	35.5	39.6	40.1	41.4	42.5	
3	63	350	590	55.6	63.1	64.0	66.1	67.8	
4	160	500	725	141	161	163	169	174	
5	630	800	1 110	557	635	645	670	691	
6	1 000	900	1 400	890	1 000	1 015	1 050	1 080	
7	(1 250)	1 000	1 400	1 099	1 251	1 269	1 321	1 361	
8	1 600	1 100	1 500	1 425	1 627	1 653	1 721	1 773	
9	2 500	1 200	2 000	2 260	2 522	2 556	2 644	2 712	
10	(3 200)	1 400	1 900	2 926	3 343	3 398	3 534	3 644	
11	4 000	1 500	2 000	3 540	4 052	4 120	4 282	4 424	
12	5 000	1 600	2 200	4 422	5 044	5 126	5 332	5 494	
13	6 300	1 700	2 500	5 675	6 421	6 519	6 765	6 961	
14	(8 000)	1 800	2 750	7 239	8 125	8 242	8 533	8 765	
15	10 000	2 000	2 850	8 949	10 165	10 323	10 723	11 045	
16	12 500	2 100	3 250	11 245	12 653	12 835	13 299	13 671	
17	16 000	2 300	3 450	14 317	16 165	16 407	17 015	17 501	
18	20 000	2 400	4 000	18 080	20 182	20 456	21 146	21 696	
19	25 000	2 600	4 250	22 567	25 239	25 587	26 565	27 167	
20	32 000	2 800	4 660	28 705	32 043	32 475	33 573	34 451	
21	50 000	3 400	4 850	44 038	50 012	50 788	52 754	54 322	
22	63 000	3 600	5 500	56 100	63 192	64 114	66 450	68 310	
23	80 000	4 000	5 600	70 560	80 290	81 552	84 756	87 310	

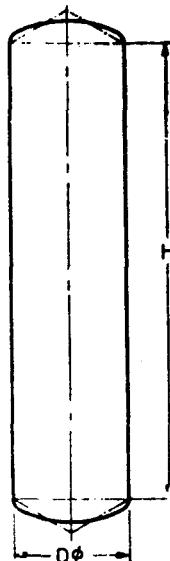
**TABLE 18 VERTICAL OR HORIZONTAL CYLINDRICAL VESSELS
WITH FORMED ENDS AND LENGTH ON STRAIGHT
(H) = APPROXIMATELY $2D$**
(Clause I.1)

Suitable for use as stills, reaction vessels, tanks, driers for extraction, etc.

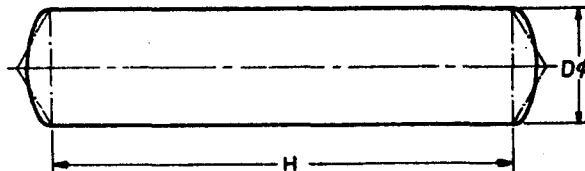


SL No.	NOMINAL CAPACITY	DIAMETER D	LENGTH ON STRAIGHT H	CYLINDER VOLUME	AGGREGATE VOLUME				
					30° Conical	Torispherical, Knuckle Radius		Deep Dished or 45° Conical	
(1)	(2) litres	(3) mm	(4) mm	(5) litres	0·06 D	0·10 D	(9) litres	(9) litres	
1	10	200	370	11·4	12·6	12·8	13·2	13·8	
2	25	250	500	24·5	26·8	27·1	27·9	28·6	
3	40	300	550	39·0	43·0	43·6	45·0	46·1	
4	63	350	650	62·4	68·9	69·7	71·9	73·6	
5	100	400	750	93·7	103	104	107	111	
6	250	500	1 200	235	254	256	263	268	
7	400	600	1 310	369	401	406	417	425	
8	630	700	1 510	581	633·5	640	657	671	
9	1 000	800	1 850	928	1 006	1 016	1 042	1 062	
10	(1 250)	900	1 800	1 144	1 255	1 269	1 306	1 335	
11	1 600	1 000	1 850	1 452	1 604	1 623	1 674	1 714	
12	2 000	1 100	1 930	1 833	2 035	2 061	2 129	2 181	
13	2 500	1 100	2 440	2 318	2 520	2 546	2 614	2 666	
14	(3 200)	1 200	2 600	2 938	3 200	3 234	3 322	3 390	
15	4 000	1 300	2 760	3 670	4 004	4 048	4 158	4 246	
16	5 000	1 400	3 000	4 620	5 036	5 092	5 228	5 338	
17	6 300	1 500	3 280	5 805	6 317	6 385	6 553	6 689	
18	(8 000)	1 700	3 200	7 264	8 010	8 108	8 354	8 550	
19	10 000	1 800	3 600	9 144	10 030	10 146	10 438	10 670	
20	12 500	1 900	4 050	11 502	12 544	12 680	13 024	13 298	
21	16 000	2 100	4 230	14 635	16 043	16 225	16 689	17 061	
22	20 000	2 300	4 400	18 260	20 108	20 350	20 958	21 444	
23	25 000	2 400	5 100	23 052	25 154	25 428	26 118	26 668	
24	32 000	2 600	5 550	29 470	32 142	32 490	33 368	34 070	
25	40 000	2 800	5 960	36 713	40 051	40 483	41 581	42 459	
26	50 000	3 200	5 600	45 024	50 004	50 652	52 292	53 600	
27	63 000	3 400	6 300	57 204	63 178	63 954	65 920	67 488	
28	80 000	3 600	7 150	72 930	80 022	80 944	83 280	85 140	

**TABLE 19 VERTICAL OR HORIZONTAL CYLINDRICAL VESSELS
WITH FORMED ENDS AND LENGTH ON STRAIGHT
(H) = APPROXIMATELY 3D**
(Clause 1.1)



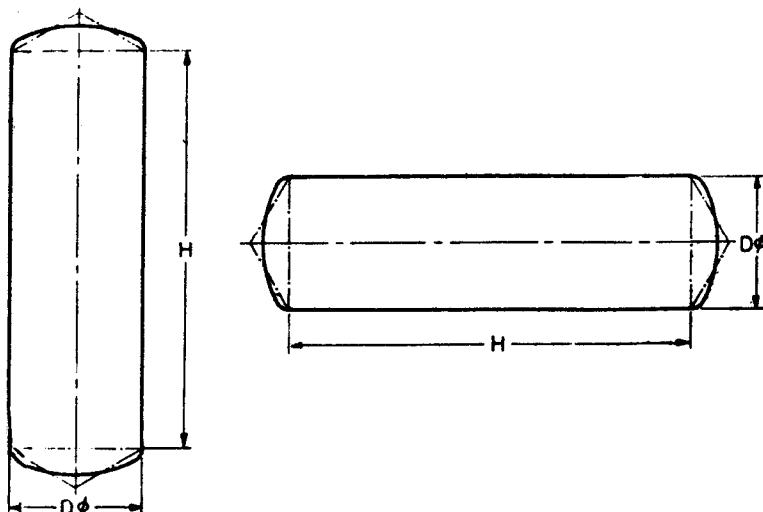
Suitable for use as stills, reaction vessels,
tanks, driers for extraction, etc.



Sl. No.	Nominal Capacity	Diameter D	Length on Straight H	Cylinder Volume	Aggregate Volume				
					30° Conical		Torispherical, Knuckle Radius $0\cdot06D$ to $0\cdot10D$		Deep Dished or 45° Conical
					(7) litres	(8) litres	(9) litres		
(1)	(2) litres	(3) mm	(4) mm	(5) litres	(6) litres	(7) litres	(8) litres	(9) litres	
1	16	200	500	15.5	16.7	16.8	17.2	17.6	
2	40	250	770	37.7	40.1	40.4	41.1	41.8	
3	63	300	850	60.3	64.4	64.9	66.3	67.4	
4	100	350	1 000	96	102	103	104	107	
5	160	400	1 210	151	160	162	165	168	
6	250	500	1 250	245	264	266	272	277	
7	1 250	800	2 350	1 179	1 257	1 267	1 293	1 313	
8	1 900	900	2 400	1 526	1 637	1 651	1 687	1 717	
9	2 000	900	2 980	1 895	2 006	2 020	2 056	2 085	
10	2 500	1 000	3 000	2 355	2 507	2 526	2 577	2 617	
11	(3 250)	1 100	3 250	3 087	3 289	3 315	3 435	3 383	
12	4 000	1 200	3 350	3 785	4 047	4 081	4 237	4 169	
13	5 000	1 300	3 550	4 721	5 055	5 099	5 297	5 209	
14	6 300	1 400	3 850	5 925	6 345	6 401	6 647	6 537	
15	(8 000)	1 500	4 250	7 522	8 034	8 102	8 406	8 270	
16	10 000	1 600	4 700	9 447	10 069	10 151	10 519	10 357	
17	12 500	1 700	5 200	11 804	12 550	11 648	13 090	12 894	
18	16 000	1 900	5 300	15 052	16 094	16 230	16 848	16 574	
19	20 000	2 000	6 000	18 840	20 056	20 214	20 936	20 614	
20	25 000	2 200	6 200	23 560	25 178	25 348	26 348	25 922	
21	32 000	2 300	7 300	30 295	32 143	32 385	33 479	32 993	
22	40 000	2 600	7 050	37 430	40 102	40 450	42 030	41 328	
23	50 000	2 800	7 600	46 816	50 154	50 586	52 562	51 684	
24	63 000	3 000	8 400	59 388	63 492	64 026	66 456	65 376	
25	80 000	3 200	9 400	75 576	80 556	81 204	84 152	82 844	

**TABLE 20 VERTICAL OR HORIZONTAL CYLINDRICAL VESSELS
WITH FORMED ENDS AND LENGTH ON STRAIGHT**
(H) = APPROXIMATELY $4D$
(Clause 1.1)

Suitable for use as stills, reaction vessels, tanks, driers for extraction, etc.

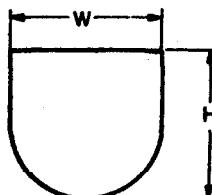
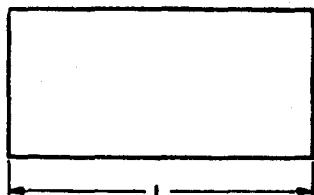


SL NO.	NOMINAL CAPACITY	DIAMETER D	LENGTH ON STRAIGHT H	CYLINDER VOLUME	AGGREGATE VOLUME			
					30° Conical		Torispherical, Knuckle Radius $0.06D$	Deep Dished or 45° Conical $0.10D$
					(7)	(8)		
(1)	(2) litres	(3) mm	(4) mm	(5) litres	(6) litres	(7) litres	(8) litres	(9) litres
1	10	150	600	10.2	10.7	10.7	10.9	11.0
2	25	200	800	24.8	26	26.1	26.5	26.9
3	40	250	900	44.1	46.4	46.5	47.5	48.2
4	100	300	1 380	97.9	102	102	103	105
5	400	500	2 000	392	411	413	419	424
6	630	600	2 200	620	653	657	668	677
7	1 000	700	2 600	1 001	1 053	1 059	1 077	1 090
8	(1 250)	700	3 120	1 201	1 253	1 260	1 277	1 291
9	1 600	800	3 100	1 556	1 634	1 636	1 669	1 690
10	(3 200)	1 000	3 900	3 061	3 213	3 233	3 283	3 323
11	4 000	1 100	4 000	3 800	4 002	4 028	4 096	4 148
12	5 000	1 200	4 250	4 802	5 064	5 098	5 186	5 254
13	(8 000)	1 400	5 000	7 700	8 116	8 172	8 308	8 418
14	10 000	1 500	5 400	9 558	10 070	10 138	10 306	10 442
15	12 500	1 600	6 000	12 060	12 682	12 764	12 970	13 132
16	16 000	1 700	6 800	15 436	16 182	16 280	16 526	16 722
17	20 000	1 800	7 600	19 304	20 190	20 306	20 598	20 830
18	25 000	2 000	7 600	23 864	25 080	25 238	25 638	25 960
19	32 000	2 100	8 850	30 621	32 029	32 211	32 675	33 047
20	40 000	2 300	9 200	38 180	40 028	40 270	40 878	41 364
21	50 000	2 400	10 600	47 912	50 014	50 288	50 978	51 528
22	63 000	2 600	11 400	60 534	63 206	63 554	64 382	65 134
23	80 000	2 800	12 500	77 000	80 338	80 770	81 868	82 746

**TABLE 21 'U' SHAPED PANS OPEN OR FLAT TOP,
SEMICIRCULAR BOTTOM AND LENGTH
(L) = APPROXIMATELY 2W**

(Clause 1.1)

Suitable for use as crystallisers, powder mixers and driers.

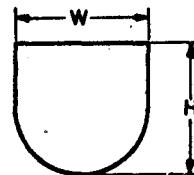
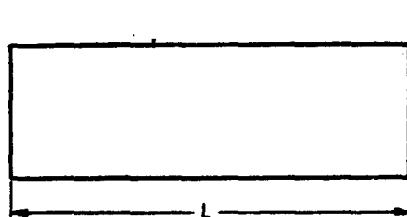


SL. No.	NOMINAL CAPACITY (1) litres	WIDTH W (2) mm	HEIGHT H (3) mm	LENGTH L (4) mm	AGGREGATE VOLUME (6) litres
1	10	200	200	350	12.6
2	16	200	200	450	16.2
3	25	250	250	500	28.0
4	40	300	300	550	44.5
5	63	350	350	650	70.8
6	100	400	400	750	107
7	160	500	500	800	178
8	250	500	500	1 200	267
9	400	600	600	1 300	417
10	630	700	700	1 450	635
11	1 000	800	800	1 800	1 028
12	(1 250)	900	900	1 800	1 301
13	1 600	1 000	1 000	1 850	1 652
14	2 000	1 100	1 100	2 000	2 160
15	2 500	1 100	1 100	2 400	2 592
16	(3 200)	1 200	1 200	2 500	3 225
17	4 000	1 300	1 300	2 700	4 077
18	5 000	1 400	1 400	2 900	5 075
19	6 300	1 500	1 500	3 150	6 331
20	(8 000)	1 600	1 600	3 550	8 094
21	10 000	1 800	1 800	3 600	10 404
22	12 500	1 900	1 900	3 900	12 558
23	16 000	2 100	2 100	4 200	16 506
24	20 000	2 200	2 200	4 700	20 304
25	25 000	2 400	2 400	5 000	25 700
26	32 000	2 600	2 600	5 400	32 562
27	40 000	2 800	2 800	5 800	40 600
28	50 000	3 000	3 000	6 300	50 589
29	63 000	3 200	3 200	7 000	63 980
30	80 000	3 600	3 600	7 000	80 500

**TABLE 22 'U' SHAPED PANS OPEN OR FLAT TOP,
SEMICIRCULAR BOTTOM AND LENGTH
(L) = APPROXIMATELY 3W**

(Clause 1.1)

Suitable for use as crystallisers, powder mixers and driers.



SL. No.	NOMINAL CAPACITY	WIDTH <i>W</i>	HEIGHT <i>H</i>	LENGTH <i>L</i>	AGGREGATE VOLUME
(1)	(2) litres	(3) mm	(4) mm	(5) mm	(6) litres
1	10	150	150	500	10·0
2	16	200	200	500	18·0
3	25	200	200	700	25·2
4	40	250	250	750	42·0
5	63	300	300	800	64·8
6	100	350	350	1 000	109
7	160	400	400	1 200	171
8	400	500	500	1 800	401
9	630	600	600	2 000	642
10	1 000	700	700	2 300	1 007
11	(1 250)	800	800	2 300	1 313
12	1 600	900	900	2 300	1 663
13	2 000	900	900	2 800	2 024
14	2 500	1 000	1 000	2 900	2 589
15	(3 200)	1 100	1 100	3 100	3 348
16	4 000	1 200	1 200	3 200	4 128
17	5 000	1 200	1 200	4 000	5 160
18	6 300	1 300	1 300	4 250	6 417
19	(8 000)	1 400	1 400	4 600	8 050
20	10 000	1 500	1 500	5 000	10 050
21	12 500	1 600	1 700	5 500	12 540
22	16 000	1 800	1 800	5 600	16 184
23	20 000	1 900	1 900	6 250	20 145
24	25 000	2 100	2 100	6 400	25 153
25	32 000	2 300	2 300	6 900	32 568
26	40 000	2 400	2 400	7 800	40 092
27	50 000	2 600	2 600	8 000	50 049
28	63 000	2 800	2 800	9 000	63 000
29	80 000	3 000	3 000	10 000	80 000

A P P E N D I X A
(Clause 0.5)
CYLINDRICAL SHELLS

NOMINAL DIAMETER <i>D</i>	CIRCUM- FERENCE	CROSS- SECTION	VOLUME CAPA- CITY/m HEIGHT	SUR- FACE/m HEIGHT	WEIGHT OF MATERIAL PER METRE HEIGHT PER MILLIMETRE MATERIAL THICKNESS		
					Ferro- us Material	Copper	Alumi- nium
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
mm	mm	m ²	litres	m ²	kg	kg	kg
100	314	0.008	7.9	0.314	2.51	2.80	0.848
125	393	0.012	12	0.393	3.14	3.51	1.06
150	471	0.017	17	0.471	3.77	4.21	1.27
200	628	0.031	31	0.628	5.02	5.61	1.70
250	785	0.049	49	0.785	6.28	7.01	2.12
300	942	0.071	71	0.942	7.54	8.41	2.54
(350)	1 100	0.096	96	1.10	8.80	9.82	2.97
400	1 257	0.125	125	1.26	10.1	11.3	3.40
500	1 571	0.196	196	1.57	12.5	14.0	4.24
600	1 885	0.282	282	1.89	15.1	16.9	5.10
700	2 199	0.385	385	2.20	17.6	19.6	5.94
800	2 513	0.502	502	2.51	20.1	22.4	6.78
900	2 827	0.636	636	2.83	22.6	25.3	7.64
1 000	3 142	0.785	785	3.14	25.1	28.0	8.48
1 100	3 456	0.950	950	3.46	27.7	30.9	9.34
1 200	3 770	1.13	1 130	3.77	30.2	33.7	10.2
(1 300)	4 084	1.33	1 330	4.08	32.6	36.4	11.0
1 400	4 398	1.54	1 540	4.40	35.2	39.3	11.9
(1 500)	4 712	1.77	1 770	4.71	37.7	42.1	12.7
1 600	5 026	2.01	2 010	5.03	40.2	44.9	13.6
1 700	5 340	2.27	2 270	5.34	42.7	47.7	14.4
1 800	5 655	2.54	2 540	5.66	45.3	50.5	15.3
(1 900)	5 969	2.84	2 840	5.97	47.8	53.3	16.1
2 000	6 283	3.14	3 140	6.28	50.2	56.1	17.0
(2 100)	6 597	3.46	3 460	6.60	52.8	58.9	17.8
2 200	6 911	3.80	3 800	6.91	55.3	61.7	18.7
2 300	7 225	4.15	4 150	7.23	57.8	64.6	19.5
2 400	7 540	4.52	4 520	7.54	60.3	67.3	20.4
2 600	8 168	5.31	5 310	8.17	65.3	73.0	22.1
2 800	8 796	6.16	6 160	8.80	70.4	78.6	23.8
3 000	9 424	7.07	7 070	9.42	75.4	84.1	25.4
3 200	10 053	8.04	8 040	10.1	80.8	90.2	27.3
(3 400)	10 681	9.08	9 080	10.7	85.6	95.6	28.9
3 600	11 310	10.2	10 200	11.3	90.4	101	30.5
(3 800)	11 938	11.3	11 300	11.9	95.2	106	32.1
4 000	12 566	12.6	12 600	12.6	101	113	34.0
(4 250)	13 351	14.2	14 200	13.4	107	120	36.2
4 500	14 137	15.9	15 900	14.1	113	126	38.1
(4 750)	14 923	17.7	17 700	14.9	119	133	40.2
5 000	15 708	19.6	19 600	15.7	126	140	42.4

$$\text{Circumference} = 3 \cdot 14 \times D \text{ mm} \quad \text{Cross-Section} = \frac{0 \cdot 7854 \times D^2}{10^6} \text{ m}^2$$

$$\text{Volumetric capacity per metre height} = \frac{0 \cdot 7854 \times D^2}{10^3} \text{ litres}$$

$$\text{Surface per metre height} = \frac{3 \cdot 14 \times D}{10^3} \text{ m}^2$$

Weights are based on the following specific gravities:

Ferrous material 8.0

Copper 8.93

Aluminium 2.7

A P P E N D I X B

(Clause 0.5)

HEMISPHERICAL HEADS

NOMINAL DIAMETER <i>D</i>	DEPTH <i>h</i>	VOLUMETRIC CAPACITY	SURFACE	WEIGHT PER MILLIMETRE MATERIAL THICKNESS		
				Ferrous Material	Copper	Aluminium
(1)	(2)	(3)	(4)	(5)	(6)	(7)
mm	mm	litres	m ²	kg	kg	kg
100	50	0.26	0.01	0.080	0.089	0.027
125	63	0.51	0.02	0.160	0.179	0.054
150	75	0.88	0.03	0.240	0.268	0.081
200	100	2.10	0.06	0.480	0.536	0.162
250	125	4.09	0.10	0.800	0.893	0.270
300	150	7.07	0.14	1.12	1.25	0.378
(350)	175	11.2	0.19	1.52	1.70	0.513
400	200	16.8	0.25	2.00	2.23	0.675
500	250	32.7	0.39	3.12	3.48	1.05
600	300	56.5	0.57	4.56	5.09	1.54
700	350	89.8	0.77	6.16	6.88	2.08
800	400	134	1.00	8.00	8.93	2.70
900	450	191	1.27	10.2	11.3	3.43
1 000	500	262	1.57	12.6	14.0	4.24
1 100	550	348	1.90	15.2	17.0	5.13
1 200	600	452	2.26	18.1	20.2	6.10
(1 300)	650	575	2.66	21.3	23.8	7.18
1 400	700	718	3.08	24.6	27.5	8.32
(1 500)	750	883	3.54	28.3	31.6	9.56
1 600	800	1 072	4.02	32.2	35.9	10.9
(1 700)	850	1 286	4.54	36.3	40.5	12.3
1 890	900	1 526	5.10	40.8	45.5	13.8
(1 900)	950	1 795	5.68	45.4	50.7	15.3
2 000	1 000	2 096	6.29	50.3	56.2	17.0
2 100	1 050	2 426	6.93	55.4	61.9	18.7

(Continued)

APPENDIX B — *Contd*

NOMINAL DIAMETER <i>D</i>	DEPTH <i>h</i>	VOLUMETRIC CAPACITY	SURFACE	WEIGHT PER MILLIMETRE MATERIAL THICKNESS		
				Ferrous Material	Copper	Aluminium
(1)	(2)	(3)	(4)	(5)	(6)	(7)
mm	mm	litres	m ²	kg	kg	kg
(2) 200	1 100	2 788	7.61	60.9	68.0	20.5
2 300	1 150	3 184	8.32	66.6	74.3	22.5
2 400	1 200	3 616	9.05	72.4	80.8	24.4
2 600	1 300	4 600	10.6	84.8	94.7	28.6
2 800	1 400	5 746	12.3	98.4	110	33.2
3 000	1 500	7 068	14.1	113	126	38.1
3 200	1 600	8 576	16.1	129	144	43.5
(3) 400	1 700	10 284	18.2	146	163	49.1
3 600	1 800	12 210	20.4	163	182	55.1
3 800	1 900	14 362	22.7	182	203	61.3
4 000	2 000	16 750	25.1	201	224	67.8
(4) 250	2 125	20 090	28.4	227	254	76.7
4 500	2 250	23 740	31.8	254	284	85.9
(4) 750	2 375	28 040	35.5	284	317	95.8
5 000	2 500	32 720	39.3	314	351	106

Depth, $h = 0.5 \times D$ mm

$$\text{Surface} = \frac{1.57 \times D^2}{10^6} \text{ m}^2$$

$$\text{Volumetric capacity} = \frac{0.2618 \times D^3}{10^6} \text{ litres}$$

APPENDIX C
(Clause 0.5)

TORISPHERICAL HEADS (KNUCKLE RADIUS = 0.06D)

SL No.	NOMINAL DIAMETER <i>D</i>	DEPTH <i>h</i>	VOLUMETRIC CAPACITY	SURFACE	WEIGHT PER MILLIMETRE MATERIAL THICKNESS		
					Ferrous Material	Copper	Aluminium
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	mm	mm	litres	m ²	kg	kg	kg
1	100	17	0.086	0.011	0.088	0.098	0.030
2	125	21	0.168	0.017	0.136	0.152	0.146
3	150	26	0.290	0.024	0.192	0.214	0.065
4	200	34	0.687	0.04	0.320	0.357	0.108
5	250	43	0.34	0.07	0.560	0.625	0.189

(Continued)

APPENDIX C — *Contd*

SL. No.	NOMINAL DIAMETER <i>D</i>	DEPTH <i>h</i>	VOLUMETRIC CAPACITY	SURFACE	WEIGHT PER MILLIMETRE MATERIAL THICKNESS		
					Ferrous Material	Copper	Aluminium
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	mm	mm	litres	m ²	kg	kg	kg
6	300	51	2.32	0.10	0.800	0.893	0.270
7	350	60	3.68	0.13	1.04	1.16	0.351
8	400	68	5.50	0.17	1.36	1.52	0.459
9	500	85	10.7	0.27	2.16	2.41	0.729
10	600	102	18.6	0.38	3.04	3.39	1.03
11	700	119	29.4	0.52	4.16	4.64	1.40
12	800	126	44.0	0.68	5.44	6.07	1.84
13	900	153	62.6	0.87	6.96	7.77	2.35
14	1 000	170	85.9	1.07	8.56	9.56	2.89
15	1 100	187	114	1.29	10.3	11.5	3.48
16	1 200	204	148	1.54	12.3	13.8	4.16
17	1 300	221	189	1.80	14.4	16.1	4.86
18	1 400	238	236	2.09	16.7	18.7	5.64
19	1 500	255	290	2.40	19.2	21.4	6.48
20	1 600	272	352	2.73	21.8	24.4	7.37
21	1 700	289	422	3.09	24.7	27.4	8.34
22	1 800	306	501	3.46	27.7	30.9	9.34
23	1 900	323	589	3.86	30.9	34.5	10.4
24	2 000	340	687	4.27	34.2	38.1	11.5
25	2 100	357	795	4.71	57.7	42.1	12.7
26	2 200	374	914	5.17	41.4	46.2	14.0
27	2 300	391	1 045	5.65	45.2	50.5	15.3
28	2 400	408	1 188	6.15	49.2	54.9	16.6
29	2 600	442	1 510	7.22	57.8	64.5	19.5
30	2 800	476	1 885	8.37	67.0	74.7	22.6
31	3 000	510	2 319	9.61	76.9	85.8	25.9
32	3 200	544	2 814	10.9	87.2	97.3	29.4
33	3 400	578	3 375	12.3	98.4	110	33.2
34	3 600	612	4 007	13.8	110	123	37.3
35	3 800	646	4 713	15.4	123	138	41.6
36	4 000	680	5 496	17.1	137	153	46.2
37	4 250	723	6 594	19.3	154	172	52.1
38	4 500	765	7 825	21.6	173	193	58.3
39	4 750	808	9 204	24.1	193	215	65.1
40	5 000	850	10 740	26.7	214	238	72.1

Volumetric capacity = $1.05 h^2 (3D - h) \times 10^{-4}$ litres

Surface = $6.28D \times h \times 10^{-6}$ m²

Depth, $h = 0.17 \times D$ mm.

A P P E N D I X D

(Clause 0.5)

TORISPHERICAL HEADS (KNUCKLE RADIUS = 0.10D)

SL No.	NOMINAL DIAMETER <i>D</i>	DEPTH <i>h</i>	VOLU- METRIC CAPACITY	SURFACE	WEIGHT PER MILLIMETRE MATERIAL THICKNESS		
					Ferrous Material	Copper	Aluminium
					(1)	(2)	(3)
	mm	mm	litres	m ²	kg	kg	kg
1	100	19	0.111	0.012	0.096	0.107	0.032
2	125	24	0.217	0.019	0.152	0.170	0.051
3	150	29	0.374	0.027	0.216	0.241	0.073
4	200	39	0.887	0.05	0.400	0.447	0.135
5	250	49	1.73	0.08	0.640	0.714	0.216
6	300	50	2.99	0.11	0.880	0.982	0.297
7	350	68	4.76	0.15	1.20	1.34	0.405
8	400	78	7.10	0.19	1.52	1.70	0.513
9	500	97	13.9	0.30	2.40	2.68	0.810
10	600	116	24.0	0.44	3.52	3.93	1.19
11	700	136	38.0	0.60	4.80	5.36	1.62
12	800	155	56.8	0.78	6.24	6.97	2.11
13	900	175	80.8	0.99	7.92	8.84	2.67
14	1 000	194	111	1.22	9.76	10.9	3.29
15	1 100	213	148	1.47	11.8	13.1	3.97
16	1 200	233	192	1.75	14.0	15.6	4.72
17	1 300	252	244	2.06	16.5	18.4	5.56
18	1 400	272	304	2.39	19.1	21.3	6.45
19	1 500	291	374	2.74	21.9	24.5	7.40
20	1 600	310	455	3.12	25.0	27.9	8.42
21	1 700	330	545	3.52	28.2	31.4	9.50
22	1 800	349	647	3.95	31.6	35.3	10.7
23	1 900	369	761	4.40	35.2	39.3	11.9
24	2 000	388	887	4.87	39.0	43.5	13.2
25	2 100	407	1 027	5.37	43.0	48.0	14.15
26	2 200	427	1 181	5.90	47.2	52.7	15.9
27	2 300	446	1 349	6.45	51.6	57.6	17.4
28	2 400	466	1 533	7.02	56.2	62.7	19.0
29	2 600	504	1 949	8.24	65.9	73.6	22.2
30	2 800	543	2 434	9.55	76.4	85.3	25.8
31	3 000	582	2 994	11.0	88.0	98.2	29.7
32	3 200	621	3 634	12.5	100	112	33.8
33	3 400	660	4 358	14.1	113	126	38.1
34	3 600	698	5 175	15.8	126	141	42.7
35	3 800	737	6 085	17.6	141	157	47.5

(Continued)

APPENDIX D — Contd

Sl. No.	Nominal Diameter <i>D</i>	Depth <i>h</i>	Volu- metric Capacity	Surface	Weight per Millimetre Material Thickness		
					Ferrous Material	Copper	Aluminium
					(1)	(2)	(3)
		mm	mm	litres	m ²	kg	kg
36	4 000	776	7 098	19·5	156	174	52·6
37	4 250	825	8 513	22·0	176	196	59·4
38	4 500	873	10 100	24·7	198	221	66·7
39	4 750	922	11 890	27·5	220	246	74·2
40	5 000	970	13 870	30·5	244	272	82·4

Volumetric capacity = $1\cdot05 h^2 (3D - h) \times 10^{-6}$ litres

Surface = $6\cdot28D \times h \times 10^{-6}$ m²

Depth, *h* = $0\cdot194 \times D$ mm

APPENDIX E

(Clause 0.5)

SEMI-ELLIPSOIDAL OR EQUIVALENT TORISPHERICAL HEADS

Sl. No.	Nominal Diameter <i>D</i>	Depth <i>h</i>	Volu- metric Capacity	Surface	Weight per Millimetre Material Thickness		
					Ferrous Material	Copper	Alumi- nium
					(1)	(2)	(3)
		mm	mm	litres	m ²	kg	kg
1	100	25	0·13	0·011	0·088	0·098	0·030
2	125	31	0·25	0·017	0·136	0·152	0·045
3	150	38	0·44	0·025	0·200	0·224	0·068
4	200	50	1·05	0·04	0·320	0·357	0·108
5	250	63	2·05	0·07	0·560	0·625	0·189
6	300	75	3·53	0·10	0·800	0·893	0·270
7	(350)	88	5·61	0·13	1·04	1·16	0·351
8	400	100	8·38	0·17	1·36	1·52	0·459
9	500	125	16·4	0·27	2·16	2·41	0·729
10	600	150	28·3	0·39	3·12	3·48	1·05

(Continued)

APPENDIX E — *Contd*

SL No.	NOMINAL DIAMETER <i>D</i>	DEPTH <i>h</i>	VOLU- METRIC CAPACITY	SURFACE	WEIGHT PER MILLIMETRE MATERIAL THICKNESS		
					Ferrous Material	Copper	Alumi- nium
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	mm	mm	litres	m ²	kg	kg	kg
11	700	175	44.9	0.53	4.24	4.73	1.43
12	800	200	67	0.70	5.60	6.25	1.89
13	900	225	95.4	0.88	7.04	7.86	2.38
14	1 000	250	131	1.09	8.72	9.73	2.94
15	1 100	275	174	1.32	10.6	11.8	3.56
16	1 200	300	226	1.57	12.6	14.0	4.24
17	(1 300)	325	288	1.84	14.7	16.4	4.97
18	1 400	350	359	2.14	17.1	19.1	5.78
19	(1 500)	375	442	2.45	19.6	21.9	6.62
20	1 600	400	536	2.79	22.3	24.9	7.53
21	(1 700)	425	643	3.15	25.2	28.1	8.50
22	1 800	450	763	3.53	28.2	31.5	9.53
23	1 900	475	898	3.93	31.4	35.1	10.6
24	(2 000)	500	1 048	4.36	34.9	38.9	11.8
25	2 100	525	1 213	4.81	38.5	43.0	13.0
26	2 200	550	1 394	5.28	42.2	47.2	14.3
27	2 300	575	1 592	5.77	46.2	51.5	15.6
28	2 400	600	1 808	6.28	50.2	56.1	17.0
29	2 600	650	2 300	7.37	59.0	65.8	19.9
30	2 800	700	2 873	8.55	68.4	76.4	23.1
31	3 000	750	3 534	9.81	78.5	87.6	26.5
32	3 200	800	4 288	11.2	89.6	100	30.2
33	3 400	850	5 142	12.6	101	113	34.0
34	3 600	900	6 105	14.1	113	126	38.1
35	(3 800)	950	7 181	15.7	126	140	42.4
36	4 000	1 000	8 375	17.4	139	155	47.0
37	(4 250)	1 063	10 045	19.7	158	176	53.2
38	4 500	1 125	11 870	22.1	177	197	59.7
39	(4 750)	1 188	14 020	24.6	197	220	66.4
40	5 000	1 250	16 360	27.2	218	243	73.4

Depth, *h* = 0.25 × *D* mm

$$\text{Volumetric capacity} = \frac{0.1309 \times D^3}{10^6} \text{ litres}$$

$$\text{Surface} = 1.09 D^2 \times 10^{-6} \text{ m}^2$$

APPENDIX F

(Clause 0.5)

45° CONICAL HEADS

NOMINAL DIAMETER <i>D</i>	DEPTH <i>h</i>	LATERAL LENGTH	VOLU- METRIC CAPACITY	SURFACE	WEIGHT PER MILLIMETRE MATERIAL THICKNESS		
					Ferrous Material	Copper	Alumi- nium
					(1)	(2)	(3)
mm	mm	mm	litres	m ²	kg	kg	kg
100	50	70	0.13	0.011	0.088	0.098	0.030
125	63	87	0.25	0.017	0.136	0.152	0.046
150	75	105	0.44	0.025	0.200	0.223	0.068
200	100	140	1.05	0.044	0.352	0.393	0.119
250	125	175	2.05	0.069	0.552	0.616	0.186
300	150	210	3.53	0.099	0.792	0.884	0.267
(350)	175	245	5.61	0.135	1.08	1.21	0.365
400	200	280	8.38	0.176	1.41	1.57	0.475
500	250	350	16.4	0.275	2.20	2.46	0.743
600	300	420	28.3	0.396	3.17	3.54	1.07
700	350	490	44.9	0.538	4.30	4.80	1.45
800	400	560	67.0	0.703	5.62	6.28	1.90
900	450	630	95.4	0.890	7.12	7.95	2.40
1 000	500	700	131	1.10	8.80	9.82	2.97
1 100	550	770	174	1.33	10.6	11.9	3.59
1 200	600	840	226	1.58	12.6	14.1	4.27
(1 300)	650	910	288	1.86	14.9	16.6	5.02
1 400	700	980	359	2.15	17.2	19.2	5.81
(1 500)	750	1 050	442	2.47	19.8	22.1	6.67
1 600	800	1 120	536	2.81	22.5	25.1	7.59
1 700	850	1 190	643	3.18	25.4	28.4	8.59
1 800	900	1 260	763	3.56	28.5	31.8	9.61
1 900	950	1 330	898	3.97	31.8	35.5	10.7
2 000	1 000	1 400	1 048	4.39	35.1	39.2	11.9
2 100	1 050	1 470	1 213	4.85	38.8	43.3	13.1
2 200	1 100	1 540	1 394	5.32	42.6	47.5	14.4
2 300	1 150	1 610	1 593	5.81	46.5	51.9	15.7
2 400	1 200	1 680	1 808	6.33	50.6	56.5	17.1
2 600	1 300	1 820	2 300	7.43	59.4	66.3	20.0
2 800	1 400	1 960	2 873	8.62	69.0	77.0	23.3
3 000	1 500	2 100	3 534	9.89	79.1	88.3	26.7
3 200	1 600	2 240	4 288	11.3	90.4	101	30.5
3 400	1 700	2 380	5 145	12.7	102	113	34.3
3 600	1 800	2 520	6 105	14.3	114	128	38.6
(3 800)	1 900	2 660	7 183	15.9	127	142	42.9

(Continued)

APPENDIX F — Contd

NOMINAL DIAMETER <i>D</i>	DEPTH <i>h</i>	LATERAL LENGTH	VOLU- METRIC CAPACITY	SURFACE	WEIGHT PER MILLIMETRE MATERIAL THICKNESS		
					Ferrous Material	Copper	Alumi- num
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
mm	mm	mm	litres	m ²	kg	kg	kg
4 000	2 000	2 800	8 375	17.6	141	157	47.5
(4 250)	2 125	2 975	10 050	19.9	159	178	53.7
4 500	2 250	3 150	11 930	22.2	178	198	59.9
(4 750)	2 375	3 325	14 030	24.8	198	221	67.0
5 000	2 500	3 500	16 360	27.5	220	246	74.3

Depth, $h = 0.5 \times D$ mmLateral length = $0.7 \times D$ mm

$$\text{Volume} = \frac{0.1309 \times D^3}{10^6} \text{ litres}$$

$$\text{Surface} = \frac{1.099 \times D^2}{10^6} \text{ m}^2$$

APPENDIX G

(Clause 0.5)

30° CONICAL HEADS

NOMINAL DIAMETER <i>D</i>	DEPTH <i>h</i>	LATERAL LENGTH	VOLUMETRIC CAPACITY	SURFACE	WEIGHT PER MILLIMETRE MATERIAL THICKNESS		
					Ferrous Material	Copper	Alumi- num
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
mm	mm	mm	litres	m ²	kg	kg	kg
100	29	58	0.08	0.009	0.072	0.080	0.024
125	36	72	0.15	0.014	0.112	0.125	0.038
150	43	86	0.26	0.020	0.160	0.179	0.054
200	58	116	0.61	0.036	0.288	0.321	0.097
250	72	144	1.19	0.056	0.448	0.500	0.151
300	86	172	2.05	0.081	0.648	0.723	0.219
(350)	101	202	3.26	0.111	0.888	0.991	0.300
400	115	230	4.86	0.145	1.16	1.30	0.392
500	144	288	9.50	0.227	1.82	2.03	0.613
600	173	346	16.4	0.326	2.61	2.91	0.880

(Continued)

APPENDIX G — Contd

NOMINAL DIAMETER <i>D</i>	DEPTH <i>h</i>	LATERAL LENGTH	VOLUMETRIC CAPACITY	SURFACE	WEIGHT PER MILLIMETRE MATERIAL THICKNESS		
					Ferrous Material	Copper	Alumi- num
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
mm	mm	mm	litres	m ²	kg	kg	kg
700	202	404	26.1	0.444	3.55	3.96	1.20
800	231	462	38.9	0.580	4.64	5.18	1.57
900	260	519	55.4	0.733	5.86	6.55	1.98
1 000	289	577	76.0	0.906	7.25	8.09	2.45
1 100	318	635	101	1.09	8.72	9.73	2.94
(1 200)	346	692	131	1.30	10.4	11.6	3.51
(1 300)	375	750	167	1.53	12.2	13.7	4.13
1 400	404	808	208	1.77	14.2	15.8	4.78
(1 500)	433	866	256	2.04	16.3	18.2	5.51
1 600	462	923	311	2.32	18.6	20.7	6.26
1 700	491	981	373	2.62	21.0	23.4	7.07
1 800	520	1 039	443	2.94	23.5	26.2	7.94
1 900	549	1 096	521	3.27	26.2	29.2	8.83
2 000	578	1 154	608	3.62	29.0	32.3	9.77
2 100	607	1 212	704	3.99	31.9	35.6	10.8
2 200	635	1 269	809	4.38	35.0	39.1	11.8
2 300	664	1 327	924	4.79	38.3	42.8	12.9
2 400	693	1 385	1 051	5.22	41.8	46.6	14.1
2 600	751	1 500	1 336	6.12	19.0	54.7	16.5
2 800	809	1 618	1 669	7.10	56.8	63.4	19.1
3 000	867	1 731	2 052	8.15	65.2	72.8	22.0
3 200	924	1 846	2 490	9.27	74.2	82.8	25.0
3 400	982	1 962	2 987	10.5	84.0	93.8	28.4
3 600	1 040	2 077	3 546	11.7	93.6	105	31.6
(3 800)	1 098	2 193	4 171	13.1	105	117	35.4
4 000	1 156	2 308	4 865	14.5	116	130	39.2
(4 250)	1 228	2 452	5 834	16.4	131	146	44.3
4 500	1 300	2 596	6 925	18.3	146	163	49.4
(4 750)	1 372	2 741	8 145	20.4	163	182	55.1
5 000	1 445	2 885	9 500	22.6	181	202	61.0

Depth, $h = 0.289 \times D$ mmLateral length = $0.577 \times D$ mm

$$\text{Volumetric capacity} = \frac{0.076 \times D^3}{10^6} \text{ litres}$$

$$\text{Surface} = \frac{0.906 \times D^2}{10^6} \text{ m}^2$$

APPENDIX H

(Clause 0.5)

10° CONICAL HEADS

SL No.	NOMINAL DIAMETER <i>D</i>	DEPTH <i>h</i>	LATERAL LENGTH	VOLU- METRIC CAPACITY	SURFACE	WEIGHT PER MILLIMETRE MATERIAL THICKNESS		
						Ferrous Material	Copper	Alumi- num
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	mm	mm	mm	litres	m ²	kg	kg	kg
1	100	9	51	0.023	0.008	0.064	0.071	0.022
2	125	11	63	0.045	0.012	0.096	0.107	0.033
3	150	13	76	0.078	0.018	0.144	0.160	0.048
4	200	18	101	0.184	0.032	0.256	0.285	0.086
5	250	22	127	0.359	0.050	0.400	0.446	0.135
6	300	26	152	0.621	0.072	0.576	0.643	0.194
7	(350)	31	178	0.986	0.098	0.784	0.875	0.264
8	400	35	203	1.47	0.128	1.02	1.14	0.346
9	500	44	254	2.88	0.199	1.59	1.78	0.538
10	600	53	304	4.97	0.287	2.30	2.56	0.775
11	700	62	355	7.89	0.391	3.13	3.49	1.05
12	800	71	406	11.8	0.510	4.08	4.55	1.38
13	900	79	456	16.8	0.646	5.17	5.77	1.74
14	1 000	88	507	23.0	0.797	6.38	7.12	2.15
15	1 100	97	558	30.6	0.964	7.71	8.61	2.60
16	1 200	106	609	39.7	1.15	9.20	10.3	3.10
17	(1 300)	115	660	50.5	1.35	10.8	12.0	3.64
18	1 400	123	710	63.1	1.56	12.5	14.0	4.21
19	(1 500)	132	761	77.6	1.79	14.3	16.0	4.83
20	1 600	141	812	94.2	2.04	16.3	18.2	5.51
21	1 700	150	863	113	2.30	18.4	20.6	6.21
22	1 800	159	913	134	2.58	20.7	23.1	6.97
23	1 900	168	964	158	2.88	23.0	25.7	7.77
24	2 000	176	1 015	184	3.19	25.5	28.5	8.61
25	2 100	185	1 066	213	3.52	28.1	31.4	9.50
26	2 200	194	1 117	245	3.86	30.9	34.4	10.4
27	2 300	203	1 167	280	4.22	33.7	37.7	11.4
28	2 400	212	1 218	318	4.59	36.7	41.0	12.4
29	2 600	229	1 320	404	5.39	43.1	48.1	14.6
30	2 800	247	1 421	505	6.25	50.0	55.8	16.9

(Continued)

APPENDIX H — Contd

SL No.	NOMINAL DIAMETER <i>D</i>	DEPTH <i>h</i>	LATERAL LENGTH	VOLU- METRIC CAPACITY	SURFACE	WEIGHT PER MILLIMETRE MATERIAL THICKNESS		
						Ferrous Material	Copper	Alumi- nium
						(1)	(2)	(3)
			mm	mm	mm	litres	m ²	kg
31	3 000	265	1 523	621	7·17	57·4	64·0	19·4
32	3 200	282	1 624	754	8·16	65·3	72·9	22·0
33	3 400	300	1 726	904	9·21	73·7	82·3	24·9
34	3 600	318	1 827	1 073	10·3	82·4	92·0	27·8
35	(3 800)	335	1 929	1 262	11·5	92·0	103	31·1
36	4 000	353	2 030	1 472	12·8	102	114	34·6
37	(4 250)	375	2 157	1 766	14·4	115	129	38·9
38	4 500	397	2 284	2 096	16·1	129	144	43·5
39	(4 750)	419	2 411	2 465	18·0	144	161	48·6
40	5 000	441	2 538	2 875	20·0	160	178	54·0

Depth, $h = 0.0882 \times D$ mm

Lateral length = $0.5076 \times D$ mm

Volumetric capacity = $\frac{0.023 \times D^3}{10^6}$ litres

Surface = $\frac{0.797 \times D^2}{10^4}$ m²

APPENDIX J

(Clause 0.5)

'U' SHAPED SHELLS

SL No.	WIDTH OR DIAMETER	HEIGHT ON PARALLEL	HEIGHT ON CURVATURE	CROSS- SECTION	VOLUME	PERIMETER	SURFACE/ METRE LENGTH	WEIGHT PER MILLIMETRE MATERIAL THICKNESS/m LENGTH		
								Ferrous Material	Copper	Alumi- num
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	mm	mm	mm	m ²	litres/ metre length	mm	m ²	kg	kg	kg
1	100	50	50	0.009	9	257	0.257	2.06	2.30	0.694
2	125	62.5	62.5	0.014	14	322	0.322	2.58	2.88	0.869
3	150	75	75	0.020	20	386	0.386	3.09	3.45	1.04
4	200	100	100	0.036	36	514	0.514	4.11	4.59	1.39
5	250	125	125	0.056	56	643	0.643	5.14	5.74	1.74
6	300	150	150	0.080	80	771	0.771	6.17	6.89	2.08
7	(350)	175	175	0.109	109	900	0.900	7.20	8.04	2.43
8	400	200	200	0.143	143	1 029	1.03	8.24	9.29	2.78
9	500	250	250	0.223	223	1 286	1.29	10.3	11.5	3.48
10	600	300	300	0.321	321	1 543	1.54	12.3	13.8	4.16
11	700	350	350	0.438	438	1 800	1.80	14.4	16.1	4.86
12	800	400	400	0.571	571	2 057	2.06	16.5	18.4	5.56
13	900	450	450	0.723	723	2 314	2.31	18.5	20.7	6.24
14	1 000	500	500	0.893	893	2 571	2.57	20.6	23.0	6.94
15	1 100	55	550	1.08	1 080	2 828	2.83	22.6	25.3	7.64
16	1 200	600	600	1.29	1 290	3 085	3.09	24.7	27.6	8.34
17	(1 300)	650	650	1.51	1 510	3 342	3.34	26.7	29.8	9.02
18	1 400	700	700	1.75	1 750	3 599	3.60	28.8	32.2	9.72
19	(1 500)	750	750	2.01	2 010	3 856	3.86	30.8	34.4	10.4
20	1 600	800	800	2.28	2 280	4 113	4.11	32.9	36.7	11.1

(Continued)

APPENDIX J — Contd

SL. No.	WIDTH OR DIAMETER	HEIGHT ON PARALLEL	HEIGHT ON CURVATURE	CROSS- SECTION	VOLUME	PERIMETER	SURFACE/ METRE LENGTH	WEIGHT PER MILLIMETRE MATERIAL THICKNESS/m LENGTH		
								Ferrous Material	Copper	Alumi- nium
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	mm	mm	mm	m ²	litres/ metre length	mm	m ²	kg	kg	kg
21	1 700	850	850	2.58	2 580	4 370	4.37	35.0	39.0	11.8
22	1 800	900	900	2.89	2 890	4 628	4.63	37.0	41.3	12.5
23	1 900	950	950	3.22	3 220	4 885	4.89	39.1	43.7	13.2
24	2 000	1 000	1 000	3.57	3 570	5 142	5.14	41.1	45.9	13.88
25	(2 100)	1 050	1 050	3.93	3 930	5 399	5.40	43.2	48.2	14.6
26	2 200	1 100	1 100	4.32	4 320	5 656	5.66	45.3	50.5	15.3
27	2 300	1 150	1 150	4.72	4 720	5 913	5.91	47.3	52.8	16.0
28	2 400	1 200	1 200	5.14	5 140	6 170	6.17	49.4	55.1	16.6
29	2 600	1 300	1 300	6.03	6 030	6 684	6.86	53.4	59.7	18.0
30	2 800	1 400	1 400	7.00	7 000	7 198	7.20	57.6	64.3	19.4
31	3 000	1 500	1 500	8.03	8 030	7 712	7.71	61.7	68.9	20.8
32	3 200	1 600	1 600	9.14	9 140	8 227	8.23	65.8	73.5	22.2
33	(3 400)	1 700	1 700	10.3	10 030	8 741	8.74	69.9	78.1	23.6
34	3 600	1 800	1 800	11.5	11 500	9 255	9.26	74.1	82.6	25.0
35	3 800	1 900	1 900	12.8	12 800	9 769	9.77	78.2	87.3	26.4
36	4 000	2 000	2 000	14.3	14 300	10 283	10.3	82.4	92.0	27.8
37	(4 250)	2 125	2 125	16.1	16 100	10 926	10.9	87.2	97.3	29.4
38	4 500	2 250	2 250	18.0	18 000	11 569	11.6	92.8	103	31.3
39	(4 750)	2 375	2 375	20.1	20 100	12 212	12.2	97.6	109	33.0
40	5 000	2 500	2 500	22.3	22 300	12 854	12.9	103	115	34.8

$$\text{Cross-section} = \frac{0.8927 \times D^2}{10^6} \text{ m}^2$$

$$\text{Perimeter} = 2.5708 \times D \text{ mm}$$

$$\text{Volume per metre length} = \frac{0.8927 \times D^2}{10^3} \text{ litres}$$

$$\text{Surface/metre length} = \frac{2.5708 \times D}{10^3} \text{ m}^2$$

(Continued from page 2)

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INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

Quantity	Unit	Symbol
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mol	mol

Supplementary Units

Quantity	Unit	Symbol
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

Quantity	Unit	Symbol	Definition
Force	newton	N	1 N = 1 kg.m/s ²
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wh = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m ²
Frequency	hertz	Hz	1 Hz = 1 c/s (s ⁻¹)
Electric conductance	siemens	S	1 S = 1 A/V
Electromotive force	volt	V	1 V = 1 W/A
Pressure, stress	pascal	Pa	1 Pa = 1 N/m ²

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22F Kalpana Area	BHUBANESHWAR 751014	5 36 27
5-8-56C L. N. Gupta Marg	HYDERABAD 500001	22 10 83
R 14 Yudhister Marg, C Scheme	JAIPUR 302005	6 98 32
117/418 B Sarvodaya Nagar	KANPUR 208005	4 72 92
Patliputra Industrial Estate	PATNA 800011	6 28 08
Hantex Bldg (2nd Floor), Rly Station Road	TRIVANDRUM 695001	31 27